Subject Categories of the Division D. Engineering

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

31
ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

19980003972 Patent and Trademark Office, Washington, DC USA
US Patent Classification Definitions. Class 277: Joint Packing
Dec. 1996; 18p; In English
Report No.(s): PB97-205140; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This is the generic class for means acting at the juncture of adjacent members to oppose the passage of fluids therebetween, and related processes of forming or using said means not elsewhere provided for. It includes means for closing the space between the members which means may be a part of the fluid itself or extraneous thereto, and means for deflecting fluid away from said juncture.

NTIS
Patents; Classifications; Packing

19980004526 Joseph (Ron) and Associates, Inc., Saratoga, CA USA
The Development of a Standardized Test Protocol for Determining the Relative Transfer Efficiency of Spray Guns ***Final Report***
Joseph, R., Joseph (Ron) and Associates, Inc., USA; Aug. 09, 1996; 269p; In English
Report No.(s): PB97-194781; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

This report describes the development of a Transfer Efficiency Test Protocol which can be used to evaluate the efficiency of a manual or automatic spray gun relative to a spray gun selected as a standard or baseline. This study focused on the six parameters considered to have the most effect on transfer efficiency: panel size, coating rheology (solvent-borne coatings), spray gun type, distance between the spray gun tip and the target (flat panels), spray gun design, and water-borne coating. The research demonstrated that the protocol will yield repeatable results, and can be sufficiently sensitive to differentiate between spray guns of different types and designs. Except with guns for which the efficiency differences are not significant, the work showed that the relative ranking of spray guns, when compared against each other, is preserved even when panel size and coating formulation are changed.

NTIS
Sprayers; Coating; Ranking

19980004636 National Inst. of Standards and Technology, Building and Fire Research Lab., Gaithersburg, MD USA
January 17, 1995 Hyogoken-Nanbu (Kobe) Earthquake: Performance of Structures, Lifelines and Fire Protection Systems ***Executive Summary***
Chung, R., National Inst. of Standards and Technology, USA; Jul. 1996; 578p; In English
Report No.(s): PB97-104160; NIST/SP-901; ICSSC/TR-18; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The National Institute of Standards and Technology's Building and Fire Research Laboratory (BFRL) dispatched an advance team of three BFRL members, followed by a larger team of 18 members made up of individuals from a number of federal agencies and others affiliated with national earthquake engineering research centers. The teams were to observe, document, and summarize important lessons from this earthquake.

NTIS
Earthquakes; Damage Assessment; Japan

19980004693 GARD Analytics, Inc., Park Ridge, IL USA
Commercial Gas Cooling: An Investment Opportunity ***Topical Report, Oct. 1996 -Mar. 1997***
Cornell, T. L., GARD Analytics, Inc., USA; Henninger, R. H., GARD Analytics, Inc., USA; Clinch, J. M., GARD Analytics, Inc., USA; Nowakowski, G. A., GARD Analytics, Inc., USA; Mar. 1997; 42p; In English
Contract(s)/Grant(s): GRI-5093-285-2485
Report No.(s): PB97-161764; GR-213-2; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The use of natural gas cooling equipment such as engine-driven chillers for air conditioning commercial buildings is known to provide operating cost savings over conventional electric chillers in many regions of the country. To be an economically viable alternative, business managers normally require that the actual savings from using gas cooling must be sufficient to pay back the higher first cost premium of gas chillers in a time period usually not exceeding three years. Simple payback analysis, alone, does

not provide the financial information necessary to make optimal long term investment decisions for central cooling plant improvements. to provide a complete picture of alternative investments, simple payback results can be effectively used in conjunction with other financial criteria such as return on investment, internal rate of return, and net present value. When evaluated in these terms, projects with even four to five year payback often exceed industry financial returns on investment and internal rate of return.
NTIS
Buildings; Air Conditioning; Cost Reduction; Operating Costs; Gas Cooling; Industries; Coolers

19980004916 Florida Univ., Dept. of Civil Engineering, Gainesville, FL USA
Evaluation of Static Capacity Prediction between SPT94 and Pileuf Load Test Data ***Final Report***
Davidson, J. L., Florida Univ., USA; May 1997; 257p; In English
Report No.(s): PB97-179295; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

The purpose of this research is to develop a new deep foundations database and to use the database to evaluate and enhance the static capacity program SPT94 by means of database comparison with load test Davisson capacities. It is also an aim to study the percentage of end bearing available for concrete piles tipped in Florida limestone. The PILEUF database has been developed using LOTUS software. Previous databases for concrete piles, steel pipe piles and steel H-piles have been combined along with newly acquired data into a single database of 213 piles. This versatile database allows specific pile types of a variety of pile types to be evaluated. Additionally, a related program named GLOBALUF has been developed primarily to evaluate pile capacity predictions.
NTIS
Static Tests; Concretes; Piles; Pile Foundations

19980005200 Southwest Research Inst., San Antonio, TX USA
Horizontal Directional Drilling Guidelines for Installing Polyethylene Gas Distribution Pipes. Topical Report, ***Nov. 1994 - Mar. 1997***
Popelar, Carl H., Southwest Research Inst., USA; Kuhlman, Chris J., Southwest Research Inst., USA; Grant, Timothy S., Southwest Research Inst., USA; Chell, G. Graham, Southwest Research Inst., USA; Feb. 1997; 27p; In English
Report No.(s): PB97-161806; SwRI-06-6879; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Directional drilling is a no-dig trenchless technology that is being used increasingly by gas utilities and their contractors to install polyethylene (PE) gas pipes. The process typically involves two major steps: (1) drilling a pilot hole from the entrance pit the exit pit that defines the installation profile, and (2) pulling in the pipeline from the exit pit to the entrance pit as the bore is enlarged through a back-reaming process. This document was developed from interviews with gas utilities that use in-house drilling crews, pipelines contractors, and construction companies that perform drilling operations. Analyses were also performed to develop guidelines ion issues such as maximum pull length, for a given size pipe. The guidelines represent recommended best practices, which, if followed, should benefit gas utilities in at least three ways by enabling them to develop: (1) company-specific internal standards for in-house drilling crews, (2) specifications for contracting for services, and (3) training and quality control procedures for in-house drilling crews and outside contractors.
NTIS
Gas Pipes; Installing; Pipelines; Pipes (Tubes); Polyethylenes; Procedures; Quality Control; Utilities

19980005249 Florida Univ., Dept. of Materials Science and Engineering, Gainesville, FL USA
Non-Destructive and Mechanical Property Evaluation of BTW Recylcled Plastic Posts ***Final Report, Aug. 1995 - Dec. 1996***
McGonigle, J. T., Florida Univ., USA; Beatty, C. L., Florida Univ., USA; Apr. 1997; 119p; In English
Report No.(s): PB97-159743; WPI-0510687; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The objective of the research in this chapter was to non-destructively characterize internal voids in recycled plastic posts. Void size and concentration data was desired to establish critical void size criteria where mechanical performance of posts decreased significantly. After establishing the best non-destructive technique, the secondary objective was to develop a procedure which allowed prediction of void sizes in posts based on the data from the technique. The feasibility of various non-destructive techniques for evaluating internal voids in recycled plastic posts was examined. Thermal, ultrasonic, infrared, and x-ray imaging were considered.
NTIS
Plastics; Nondestructive Tests; Mechanical Properties; Fences (Barriers); Poles (Supports); Recycling

19980005251 EBA Engineering, Inc., Baltimore, MD USA

Long-Term Pavement Performance Information Management System Data Users Reference Manual

Ostrom, B. K., EBA Engineering, Inc., USA; Walker, D., EBA Engineering, Inc., USA; Harris, S., EBA Engineering, Inc., USA; Rowshan, S., EBA Engineering, Inc., USA; May 1997; 58p; In English

Contract(s)/Grant(s): DTFH61-95-Z-00086

Report No.(s): PB97-164073; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The Long-Term Pavement Performance Information Management System (LTPP IMS) data Users Reference Manual contains an overview of the LTPP program and the data available to researchers. LTPP is a 20-year study of pavements to improve design, rehabilitation, and maintenance practices. This documents is intended to assist researchers in understanding the data that are currently available for General Pavements Studies experiments and how to obtain it. The General Pavement Studies are a group of asphalt concrete (AC) and portland cement concrete (PCC) experiments using in-service pavements. In addition to materials test results for the pavement sections, data on pavement history, maintenance, and rehabilitation are stored in the IMS. Information on distress transverse profile, cross profile, pavement deflection, and traffic is collected on a routine basis and added to the data base regularly. The manual includes information on the quality control process. One chapter discusses a related, but separate, traffic database.

NTIS

Asphalt; Cements; Concretes; Pavements; Quality Control; Traffic

19980005279 Maryland Univ., Center for Environmental Energy Engineering, College Park, MD USA

Transient and Steady State Performance of R-22 and R-407C

Judge, J. F., Maryland Univ., USA; Radermacher, R., Maryland Univ., USA; 1995; 11p; In English; International Mechanical Engineering Congress and Exposition, 12-13 Nov. 1995, San Francisco, CA, USA

Report No.(s): PB97-195580; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The paper gives results of an investigation of the performance of refrigerants R-407C and R-22 with and without a suction line heat exchanger. The cyclic and steady state performances of both refrigerants were investigated in an air conditioner/heat pump. The combined impact of cyclic and steady state performances was evaluated through the cooling and heating seasonal performance, depending on the climate. The steady state tests indicate that there is no benefit from using a suction line heat exchanger for either fluid. However, R-22 and R-407C benefit from the suction line heat exchanger during cycling tests. Utilizing the suction line heat exchanger reduces the performance, degradation associated with cyclic operation by 5.5 and 8.1% for R-22 and R-407C, respectively.

NTIS

Degradation; Heat Exchangers; Heat Pumps; Heating Equipment; Refrigerants

19980005592 NERAC, Inc., Tolland, CT USA

Plating on Plastics and Elastomers (Latest citations from the Ei Compendex*Plus Database)

May 1996; In English; Page count unavailable

Report No.(s): PB96-870357; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, and evaluation of plating materials and processes. Fabrication and properties of nickel, copper, aluminum, and gold plated films are discussed. Citations also examine applications in packages, solar cells, batteries, automobile parts, waveguides, electric insulators, and electromagnetic interference shielding.

NTIS

Bibliographies; Plating; Elastomers; Plastics; Metal Films; Gold Coatings; Electromagnetic Interference; Aluminum; Copper

19980005856 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden

Closure of Rinse-Systems: Methods and Calculation Models *Slutning av Skoeljvattensystem: Metoder och Beraekningsmodeller*

Tolf, J., Swedish Water and Air Pollution Research Lab., Sweden; Filipsson, S., Swedish Water and Air Pollution Research Lab., Sweden; May 1996; 57p; In Swedish

Report No.(s): PB97-102214; IVL-B-1229; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Large amounts of rinse water is used within the engineering industry and the steel and non-ferrous metal industry. Meanwhile, the environmental demands for introduction of closed processes with less effluents are increased. Different rinse-systems are examplified in the report. Models for calculations of the specific water consumption in the examplified systems are described.

Furthermore are principles of separation techniques that can be used in order purify and reuse spent rinse water described in the report. Technical limitations of separation techniques are described as well as investment costs and operating cost that should be considered. Results from tests with purification of spent rinse waters in laboratory scale and pilot scale are described and disucssed in the report. The tests have been carried out with rinse water subsequent to alkaline degreasing and mixed acid (HF/HNO3) pickling.
NTIS
Waste Water; Water Consumption; Industries; Effluents; Ferrous Metals; Steels; Chemical Cleaning

19980006147 NERAC, Inc., Tolland, CT USA
Insert Molding (Latest citations from the Rubber and Plastics Research Association Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870191; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the addition of inserts in the molding process. Manual and automatic insert placement technologies are discussed. References cover machinery and molds for insert molding and the use of industrial robots to place inserts into molds. Blow molding, rotary molding, and injection molding around inserts are examined. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Inserts; Molds

19980006229 NERAC, Inc., Tolland, CT USA
High Energy Rate Forming: Ultrasonic, Electromagnetic, Pneumatic, and Hydraulic Forming (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870217; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use of ultrasonic, electromagnetic, pneumatic, and hydraulic energy to form components. Citations review research, development, and applications relating to forging, extrusion deformation, and dies. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Forging; Extruding; Dies

32
COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications. For related information see also 04 Aircraft Communications and Navigation and 17 Space Communications, Spacecraft Communications, Command and Tracking. For search and rescue see 03 Air Transportation and Safety, and 16 Space Transportation.

19980003921 NERAC, Inc., Tolland, CT USA
Radio Jamming (Latest citations from the NTIS Bibliographic Database)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851307; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning techniques for jamming and recovering radio transmissions. Topics include signal processing, spread spectrum, frequency hopping, noise cancellation, coding/decoding, multipath transmission, and countermeasures.
NTIS
Bibliographies; Countermeasures; Multipath Transmission; Spread Spectrum Transmission; Signal Processing; Radio Transmission

19980003923 NERAC, Inc., Tolland, CT USA
Broadband Antennas (Latest citations from the NTIS Bibliographic Database)
Nov. 1996; In English; Page count unavailable

Report No.(s): PB97-851273; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design and applications of antennas and antenna arrays with good impedance matching and VSWR characteristics over a wide frequency range. Antennas with broadband capabilities are especially useful to limit numbers of antennas and interference for multi-frequency electromagnetic scanning, satellite and tropospheric scatter communications, communications in electronic countermeasures or jamming environments, and radio direction-finding. Included are design data for specific applications, and performance and radiation patterns of the antennas.
NTIS
Antenna Radiation Patterns; Bibliographies; Direction Finding; Frequency Ranges; Standing Wave Ratios; Antenna Arrays

19980003975 Federal Communications Commission, Office of Plans and Policy, Washington, DC USA
Digital Tornado: The Internet and Telecommunications Policy
Werbach, K., Federal Communications Commission, USA; Mar. 1997; 102p; In English
Report No.(s): PB97-161905; FCC/OPP/WP-29; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The paper seeks to develop a consistent public policy approach for issues involving the Internet and telecommunications policy. Section I provides a framework for understanding the dynamism of the Internet, and the fundamental forces that propel it. Section II identifies the salient characteristics of the Internet. This section also provides a brief history of the Internet, to place the analysis of the current Internet in a proper context. Section III examines whether existing FCC regulatory and statutory requirements should apply to services provided over the Internet. Section IV looks at the economics of Internet usage. Section V considers the extent to which users can take advantage of the Internet. Section VI concludes by linking the Internet-specific issues with the FCC's overarching efforts to facilitate competition in all communications markets.
NTIS
Telecommunication; Communication Networks; Policies; Internets; Information Systems

19980003990 NERAC, Inc., Tolland, CT USA
Pulse Compression. (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-860044.
Report No.(s): PB97-852024; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and assessment of pulse compression technology. Optical, magnetic, RF, chirped, and phase and carrier-free coded pulse compression are examined. References also discuss pulse compressors, compressed pulse separation, pulse shaping and reshaping, chirped and sub-picosecond pulses, bandpass and low-pass filters, fiber grating, and frequency doubling. Applications include optical and digital communication, radar systems, meteorological measurements, plasma diagnostics, and materials testing.
NTIS
Bibliographies; Pulse Compression; Pulse Communication; Optical Communication; Meteorological Parameters; Bandpass Filters; Telecommunication

19980004000 Computer Sciences Corp., Hanover, MD USA
ITS Telecommunications: Public or Private? A Cost Tradeoff Methodology Guide
Dec. 16, 1996; 68p; In English
Report No.(s): PB97-160634; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Topics covered include: Requirements analysis; Developing Alternative Technical Architectures; Define Costs; Calculate and Compare Option Life-Cycle Costs; and Perform Sensitivity Analysis.
NTIS
Telecommunication; Cost Analysis; Transportation; Management Planning

19980004021 Argonne National Lab., IL USA
Generalized communicators in the message passing interface
Foster, I., Argonne National Lab., USA; Kesselmman, C., California Inst. of Tech., USA; Snir, M., IBM Watson Research Center, USA; [1996]; 8p; In English; 1996 Message Passing Interface (MPI) Developers Conference, 1-2 Jul. 1996, Notre Dame, IN, USA
Contract(s)/Grant(s): W-31-109-eng-38; NSF CCR-88-09615
Report No.(s): ANL/MCS-P-596-0596; CONF-9607124-6; DE97-000688; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

We propose extensions to the Message Passing Interface (MPI) that generalize the MPI communicator concept to allow multiple communication endpoints per process, dynamic creation of endpoints, and the transfer of endpoints between processes. The generalized communicator construct can be used to express a wide range of interesting communication structures, including collective communication operations involving multiple threads per process, communications between dynamically created threads, and object-oriented applications in which communications are directed to specific objects. Furthermore. this enriched functionality can be provided in a manner that preserves backward compatibility with MPI. We describe the proposed extensions, illustrate their use with examples, and discuss implementation issues.
DOE
Object-Oriented Programming; Algorithms; Data Transmission; Parallel Processing (Computers)

19980004033 NERAC, Inc., Tolland, CT USA
Radar Jamming. (Latest citations from the NTIS Bibliographic Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-858808.
Report No.(s): PB97-851976; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning radar jamming techniques. Topics include signal processing, adaptive processing, radar clutter, target detection, countermeasures, and counter countermeasures.
NTIS
Bibliographies; Radar Detection; Jamming

19980004036 Center for Mathematics and Computer Science, Dept. of Algebra, Analysis and Geometry, Amsterdam, Netherlands
Spatial Localization for a General Reaction-Diffusion System
Galiano, G., Universidad Complutense, Spain; Peletier, M. A., Center for Mathematics and Computer Science, Netherlands; May 1996; 20p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-176200; CWI-AM-R9606; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

We use a local energy method to study the spatial localization of the supports of the solutions of a reaction-diffusion system with nonlinear diffusion and a general reaction term. We establish a speed of propagation and the existence of waiting time under a set of weak assumptions on the structural form of the system. These assumptions allow for additive and multiplicative reaction terms and space- and time-dependence of the coefficients, as well as a divergence-free convection term.
NTIS
Chemical Compounds; Convection-Diffusion Equation; Ground Water; Energy Methods

19980004075 Pacific Northwest Lab., Richland, WA USA
Legal and policy issues associated with monitoring employee E-mail
Segura, M. A., Pacific Northwest Lab., USA; Rither, A. C., Pacific Northwest Lab., USA; Jan. 1997; 51p; In English
Contract(s)/Grant(s): DE-AC06-76RL-01830
Report No.(s): PNNL-11447; DE97-051567; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This paper examines the legal issues involved with employer monitoring of employee e-mail. In addition to identifying pertinent legal issues, the paper provides guidelines that will help the Pacific Northwest National Laboratory (PNNL) establish a program for monitoring outgoing e-mail to insure compliance with company policies, particularly those regarding protection of trade secrets and proprietary information, and to comply with the Department of Energy's (DOE) procedures for protecting Export Controlled Information (ECI). Electronic communication has allowed companies to enhance efficiency, responsiveness and effectiveness. E-mail allows employees to transmit all types of data to other individuals inside and outside of their companies. The ease with which information can be transmitted by e-mail has placed trade secrets, proprietary information, and other sensitive data at risk from inadvertent disclosure by employees. As employers attempt to protect their interests through measures such as monitoring e-mail, they may expose themselves to liability under federal and state laws for violating employee privacy. Business use of e-mail has proliferated so rapidly that the federal and state legal systems have not been able to adequately address the issues arising out of its use in the workplace.
DOE
Telecommunication; Communication Networks; International Trade; Laws; Sensitivity

19980004085 Air Force Inst. of Tech., School of Logistics and Acquis Ition Management, Wright-Patterson AFB, OH USA
An Investigation of Prioritizing Research Topics in Professional Communication
Buschagen, Richard G., Air Force Inst. of Tech., USA; Sep. 1997; 70p; In English
Report No.(s): AD-A329838; AFIT/GCM/LAL/97S-1; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This research explored which areas and methods of research need to be identified and developed to most effectively communicate business and technical information. The research was sparked by the current literature which indicates that a gap exists between academicians, who do most of the research, and practitioners, who utilize the research results. This effort was intended to address possible causes of this problem by establishing the importance of nine research topic areas, six data collection methods/sources, and three data analysis methods for both academicians and researchers and other demographic characteristics. The research concludes that the participants generally agreed on which factors were most important. Findings indicated that researchers and practitioners tended to agree on data analysis methods and data collection methods/sources but did show some disagreement on research topic areas. The research also uncovered evidence that demographic characteristics such as level of degree, area of degree, job, and English as a first language may influence which factors are considered to be most important to the professional communication process.
DTIC
Voice Communication; Information Dissemination

19980004131 NERAC, Inc., Tolland, CT USA
Digital Video Discs: Latest citations from the INSPEC Database
Jun. 1996; In English; Page count unavailable.
Report No.(s): PB96-871223; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the new and advanced digital disc technology for use in video storage systems. Digital video disc (DVD) is a multimedia storage device and is designed to replace videotapes, CDs, and CD-ROMs. Topics cover rewritable DVDs, online removable discs, digital video interactive technology, disc access and readout, video libraries, video network servers, direct broadcast entertainment, and intelligent consumer networks. Super-density standard for next generation optical discs is explored.
NTIS
Bibliographies; Video Disks; Multimedia; Digital Television; Video Tapes; Broadcasting

19980004138 NERAC, Inc., Tolland, CT USA
Broadband Digital Video: Latest citations from the INSPEC Database
Jun. 1996; In English; Page count unavailable.
Report No.(s): PB96-871017; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and assessment of broadband digital video systems used in telecommunication services. Topics cover broadband digital subscriber lines, switched and multichannel digital video, twisted pair cables, near end crosstalk, hybrid fiber-coaxial networks, high-bit rate digital techniques, and optical access networks. Applications include digital video broadcasting, cable television, interactive multimedia services, video telephony, and mobile communication.
NTIS
Bibliographies; Broadcasting; Communication Cables; Digital Television; Multimedia; Telecommunication; Video Communication; Television Systems

19980004496 NERAC, Inc., Tolland, CT USA
Spread Spectrum Communications: Latest citations from the Ei Compendex*Plus Database
Jun. 1996; In English; Page count unavailable, Supersedes PB95-868097.
Report No.(s): PB96-871025; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and assessment of spread spectrum technology for use in telecommunication systems. References discuss direct sequence and frequency hopping techniques and systems. Topics include pseudonoise modulation, coding, signal processing, synchronization, antijamming interference rejection, antennas, and the use

of surface acoustic wave technology. Applications include satellite, secure communications, multiplexed, and multiple access systems.
NTIS
Bibliographies; Telecommunication; Spread Spectrum Transmission; Multiple Access; Frequency Hopping; Signal Processing; Surface Waves; Sound Waves; Coding

19980004497 NERAC, Inc., Tolland, CT USA
Mixed-Signal Design: Latest citations from the INSPEC Database
Jun. 1996; In English; Page count unavailable.
Report No.(s): PB96-871173; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and implementation of mixed-signal system design technology. Logic, model-based, cell-based, constraint-driven, and top-down design methods are examined. References cover mixed-signal VLSI design methodologies. Applications in automotive electronics, advanced electronic systems, low voltage power lines, global positioning systems, video communication, and recursive neural networks are included.
NTIS
Bibliographies; Neural Nets; Signal Generators; Systems Engineering; Video Communication; Very Large Scale Integration

19980004506 Department of Agriculture, Rural Utilities Service, Washington, DC USA
RUS General Specification for Digital, Stored Program Controlled Central Office Equipment, RUS Form 522
Jan. 1996; 153p; In English
Report No.(s): PB97-192280; USDA/RUS/BULL-1753E-001; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This bulletin covers general requirements for a digital telephone central office switching system, which is fully electronic and controlled by stored program processors. A digital switching system transfers information which is digitally encoded from any input port to a temporarily addressed exit port. The information may enter the system in either analog or digital form and may or may not be converted to analog at the exit port depending on the facility beyond. The switching system shall operate properly as an integral part of the telephone network when connected to physical and carrier derived circuits meeting RUS specifications and other generally accepted telecommunications practices.
NTIS
Switching Circuits; Standards; Telephony; Pulse Communication

19980004510 Technische Univ., Centre for Telematics and Information Technology, Twente, Netherlands
Handover Mechanisms in ATM-Based Mobile System
Karagiannis, G., Technische Univ., Netherlands; deLignie, M. C., KPN Research, Netherlands; deBie, J., KPN Research, Netherlands; Niemegeers, I. G. M. M., Technische Univ., Netherlands; 1997; ISSN 1381-3625; 16p; In English
Report No.(s): PB97-208359; CTIT-TR-96-25; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The main theme of this paper is the presentation of two handover mechanisms that can be used in the ATM access network. The first handover mechanism is relatively easy and assumes that there is sufficient time available such that all data and history information of the old path can be transferred to the Mobile Terminal (MT) before the actual handover to the new path takes place. This first mechanism is called 'handover synchronized switching.' It is possible that the time between a handover decision and the actual handover is too short to end the transmission on the old path gracefully (e.g., ending the interleaving matrix, ending transcoder functions, emptying intermediate buffers). A possible solution for this problem is given by the second handover mechanism where multicast connections are used in the core network. This mechanism is called 'handover with multicast support.'
NTIS
Packet Switching; Message Processing; Mobile Communication Systems; Asynchronous Transfer Mode

19980004519 National Telecommunications and Information Administration, Inst. for Telecommunication Sciences, Boulder, CO USA
FM Subcarrier Corridor Assessment for the Intelligent Transportation System
DeBolt, R. O., National Telecommunications and Information Administration, USA; DeMinco, N., National Telecommunications and Information Administration, USA; Jan. 1997; 35p; In English
Report No.(s): PB97-185573; NTIA-97-335; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report documents the assessment of FM subcarrier performance for Intelligent Transportation Systems (ITS) applications in three areas of interest in the USA. These areas are: (1) The Interstate 95 corridor from Richmond, Virginia, to Portland,

Maine, (2) The Midwest corridor from Gary, Indiana, to Chicago, Illinois, and Milwaukee, Wisconsin, along Interstates 80, 90, and 94; and (3) The Atlanta, Georgia, Metropolitan Area. This study indicates that subcarrier systems of carefully chosen FM stations can provide good performance for ITS applications.
NTIS
Radio Communication; Highways; Transportation

19980004566 Virginia Transportation Research Council, Charlottesville, VA USA
Investigation of Fiber-Reinforced Concrete for Use in Transportation Structures ***Final Report, 6 May 1993 - 7 Jan. 1997***
Ozyildirim, C., Virginia Transportation Research Council, USA; Moen, C., Virginia Transportation Research Council, USA; Hladky, S., Virginia Transportation Research Council, USA; Apr. 1997; 31p; In English
Report No.(s): PB97-159693; VTRC-97-R15; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report presents the results of a laboratory investigation to determine the properties of fiber-reinforced concretes (FRCs) with steel (hooked-end), polypropylene (monofilament and fibrillated), and the recently introduced polyolefin fibers (monofilament) for use in pavement and bridge deck overlay applications. Concrete properties in the unhardened and hardened states were evaluated and compared. Although the ultimate splitting tensile strength, compressive strength, and first crack strength were higher in most of the FRCs, when strength values were adjusted for changes in air content, only a few batches had higher strengths. The addition of fibers resulted in great improvements in flexural toughness and impact resistance.
NTIS
Pavements; Fiber Composites; Concretes; Reinforcing Fibers

19980004567 Department of Agriculture, Rural Utilities Service, Washington, DC USA
Statistical Report Rural Telecommunications Borrowers, 1995
1997; 245p; In English
Report No.(s): PB97-165591; USDA-RUS-IP-300-4; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

This report presents financial and statistical information on the operation of the Rural Utilities Service, and the Rural Telephone Bank and their borrowers during calendar year 1995, and as of December 31, 1995. Borrowers' operating and financial data are based on operating reports submitted to RUS. To provide a more accurate representation of the RUS Rural Telecommunications Program, the report excludes balance sheet and operating data from State and National tables and charts of five borrowers whose assets exceed $170 million and whose total RUS and RTB loans and RUS guarantee commitments were less than approximately 20 percent of their total assets.
NTIS
Financial Management; Rural Areas; Telephones; Utilities

19980004588 Los Alamos National Lab., NM USA
Analysis and design methodology for the development of optimized, direct-detection CO2 DIAL receivers
Cooke, B. J., Los Alamos National Lab., USA; Laubscher, B. E., Los Alamos National Lab., USA; Cafferty, M., Los Alamos National Lab., USA; 1996; 35p; In English; Annual Meeting of the Society of Photo-Optical Instrumentation Engineers, 22-26 Jul. 1996, San Diego, CA, USA
Contract(s)/Grant(s): W-7405-eng-36
Report No.(s): LA-UR-96-4703; CONF-960702-1; DE97-002375; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The analysis methodology and corresponding analytical tools for the design of optimized, low-noise, hard target return CO(sub 2) Differential Absorption Lidar (DIAL) receiver systems implementing both single element detectors and multi-pixel imaging arrays for passive/active, remote-sensing applications are presented. System parameters and components composing the receiver include: aperture, focal length, field of view, cold shield requirements, image plane dimensions, pixel dimensions, pixel pitch and fill factor, detection quantum efficiency, optical filter requirements, amplifier and temporal sampling parameters. The performance analysis is accomplished by calculating the system's CO(sub 2) laser range response, total noise, optical geometric form factor and optical resolution. The noise components include speckle, photon noise due to signal, scene and atmospheric background, cold shield, and electronic noise. System resolution is simulated through cascaded optical transfer functions and includes effects due to atmosphere, optics, image sampling, and system motion. Experimental results of a developmental single-element detector receiver designed to detect 100 ns wide laser pulses (10 - 100 kHz pulse repetition rates) backscattered from hard-targets

at nominal ranges of 10 km are presented. The receiver sensitivity is near-background noise limited, given an 8.5-11.5 (mu)m radiant optical bandwidth, with the total noise floor spectrally white for maximum pulse averaging efficiency.
DOE
Design Analysis; Optimization; Optical Radar; Pulsed Lasers; Quantum Efficiency; Reliability Analysis; Remote Sensing

19980004611 Alaska Univ., Geophysical Inst., Fairbanks, AK USA
Electromagnetic Codes in Complex Geometries ***Final Report, Apr. 1994 - Mar. 1997***
Swift, Daniel W., Alaska Univ., USA; May 1997; 28p; In English
Contract(s)/Grant(s): F49620-94-I-0218
Report No.(s): AD-A329740; AFOSR-TR-97-0394; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The project objective is the development of codes to simulate the interaction of charged particles and the electromagnetic field inside of complex chambers. This project is applicable to simulation of microwave devices. The codes are built around the use of generalized curvilinear coordinate systems based on hexahedral elements that can be made to conform to complex boundary surfaces. The new element in this project is the use of multiple coordinate patches to accommodate discontinuous and cylindrical surfaces. The main accomplishment is the development of techniques to allow integration of the Maxwell equations across coordinate discontinuities. The technique is demonstrated on a solid cylinder of variable cross section. The report also presents grid generation techniques.
DTIC
Charged Particles; Particle Interactions; Electromagnetic Fields; Spherical Coordinates

19980004635 NERAC, Inc., Tolland, CT USA
Radar Cross Section Measurement (Latest citations from the INSPEC Database)
Oct. 1996; In English; Page count unavailable
Report No.(s): PB97-850788; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the measurement of the radar cross section for materials, aerospace components, targets, and low observable vehicles. The citations focus on test facilities, radar systems, anechoic chambers, and test equipment. The citations also examine antenna testing, electromagnetic wave scattering, microwave measurement, and measurement errors. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Radar Cross Sections; Bibliographies; Radar Antennas

19980004639 Florida Univ., Dept. of Electrical Engineering, Gainesville, FL USA
Location of Sources of Radiation Using a Weighted Hyperbolic Technique ***Final Report***
Thomson, E. M., Florida Univ., USA; 1995; 7p; In English
Contract(s)/Grant(s): NAG10-135
Report No.(s): NASA/CR-97-206391; NAS 1.26:206391; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The specific problem objective was to locate the sources of radiated electric field from lightning using an overdetermined set of measurements of time-of-arrival. A similar problem exists for epicentral sources in earthquake location, acoustic sources of thunder, and terrestrial navigation using LORAN and GPS.
Derived from text
Navigation; LORAN; Global Positioning System; Time Measurement; Sound Generators; Electric Fields; Earthquakes

19980004663 NERAC, Inc., Tolland, CT USA
Synthetic Aperture Radar: Remote Sensing. (Latest Citations from the INSPEC Database)
Jan. 1997; In English; Page count unavailable. Supersedes PB96-861760
Report No.(s): PB97-854913; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and use of synthetic-aperture radar (SAR) for remote sensing of global features. Topics include spaceborne and airborne SAR imagery techniques for ocean wave studies, coastal observations, sea ice motion, land use evaluation, and landform analysis. Software and hardware use in SAR image processing is also considered. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Synthetic Aperture Radar; Remote Sensing

19980004677 NERAC, Inc., Tolland, CT USA

Voice and Electronic Mail. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)

Sep. 1996; In English; Page count unavailable.

Report No.(s): PB96-873708; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning voice and electronic mail devices and systems. Citations cover voice and electronic message transmitting and receiving, voice mail devices for use in telephone systems, electronic mail box systems, digital data storage and retrieval, remote data systems, call logging and blocking, paging systems, and electronic mail with news bulletins. Methods and systems for integrating voice, electronic, and facsimile mail through personal computers are included. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Electronic Mail; Voice Communication

19980004697 Saclay Research Centre, Dept. d'Astrophysique, de la Physique des Particules, de la Physique Nucleaire et de l'Instrumentation Associee, Gif-sur-Yvette, France

Intermediate energy electromagnetic interactions

Garcon, M., Saclay Research Centre, France; Nov. 1994; 6p; In English; 11th; International Symposia on High Energy Spin Physics and Polarization Phenomena In Nuclear Physics, 15-22 Sep. 1994, Bloomington, IN, USA

Report No.(s): CEA-DAPNIA-SPhN-94-58; CONF-9409103; DE97-613166; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

Polarization measurements in electromagnetic interactions are reviewed. Deep inelastic scattering of polarized electrons and muons an polarized targets, photoproduction of pseudoscalar mesons on protons, photonuclear reactions, and the electromagnetic structure of the deuteron are discussed.

DOE

Inelastic Scattering; Polarized Radiation; Polarized Elastic Waves; Electromagnetic Interactions

19980004707 NERAC, Inc., Tolland, CT USA

Discrete Cosine Transform: Data and Image Compression. (Latest citations from the INSPEC Database)

May 1997; In English; Page count unavailable. Supersedes PB96-862206.

Report No.(s): PB97-860233; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and evaluation of discrete cosine transform (DCT) for use in data and image compression. DCT is one of the most efficient compression techniques. Citations discuss DCT coefficient quantization, coding, algorithms, modules, bit rate reduction, and video compression. References to applications in medical data processing, digital communication, video and HDTV recording, and television broadcasting are covered.

NTIS

Data Compression; Pulse Communication; Video Compression; Bibliographies; Data Processing; Broadcasting; Coding; Discrete Cosine Transform

19980004708 NERAC, Inc., Tolland, CT USA

Aircraft Antennas. (Latest citations from the NTIS Bibliographic Database)

May 1997; In English; Page count unavailable. Supersedes PB96-862115.

Report No.(s): PB97-860217; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design and applications of aircraft communication, navigation, and experimental antennas. Topics include radiation pattern calculations and measurements, antenna couplings, jamming problems, conformal arrays, microstrip antennas, and phased array aircraft antennas.

NTIS

Bibliographies; Antenna Arrays; Aircraft Antennas; Phased Arrays; Microstrip Antennas; Antenna Radiation Patterns; Antenna Couplers; Aircraft Communication

19980004725 Saclay Research Centre, Dept. d'Astrophysique, de la Physique des Particules, de la Physique Nucleaire et de l'Instrumentation Associee, Gif-sur-Yvette, France

Electromagnetic strangeness production and hadronic form factors

Charles, C., Saclay Research Centre, France; David, J. C., Saclay Research Centre, France; Guidal, M., Saclay Research Centre, France; Saghai, B., Saclay Research Centre, France; Fayard, C., Centre National de la Recherche Scientifique, France; Lamot, G. H., Centre National de la Recherche Scientifique, France; Mar. 1995; 4p; In English; 15th; European Conference on Few-Body Problems In Physics, 5-9 Jun. 1995, Peniscola, Spain

Report No.(s): CEA-DAPNIA-SPhN-95-13; CONF-9506259; DE97-613169; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

Using a phenomenological approach based on an isobaric model including s, u, and t-channels, a thorough study of the associated strangeness electromagnetic production has been performed. The sensitivity to the hadronic form factors of the reactions ep (yields) e(sup ')K(sup +)Y, with Y (identical to) (Lambda), (Sigma)(sup 0) in the few GeV region is discussed. The results corresponding to the baryonic form factors by Gari and Kruempelmann are reported.

DOE

Electromagnetic Interference; Particle Production; Phenomenology; Strangeness

19980004810 NERAC, Inc., Tolland, CT USA

Broadband Multimedia Communication Services. (Latest citations from the INSPEC Database)

Sep. 1996; In English; Page count unavailable.

Report No.(s): PB96-873674; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design and development of broadband networks for use in multimedia communication services. References review hardware and software network structures, integrated service digital networks, network resource control, flexible network connection, asynchronous transfer mode networks, burst traffic control, multi-connection and multi-party calls, real-time business communication, and teleshopping. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Multimedia; Bibliographies; Communication Networks; Broadband

19980004811 NERAC, Inc., Tolland, CT USA

Teleconferencing. (Latest citations from the NTIS Bibliographic Database)

Nov. 1996; In English; Page count unavailable. Supersedes PB96-854591.

Report No.(s): PB97-851687; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use and evaluation of teleconferencing systems. Topics include human factors aspects, the use of teleconferencing operations in education, decision making, and speech compression methods. The influence of teleconferencing on energy conservation and travel is also considered. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Teleconferencing

19980004819 NERAC, Inc., Tolland, CT USA

Radome Technology. (Latest citations from the NTIS Bibliographic Database)

Nov. 1996; In English; Page count unavailable. Supersedes PB96-854211.

Report No.(s): PB97-851653; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, and evaluation of radomes. The use of dielectrics, ceramics, plastics, composite materials, and protective coatings for the construction of radomes is examined. Topics include radome transmission behavior, antenna loss, pattern degradation, environmental erosion, and frequency selective surfaces. Radomes for radar, aircraft, and missile antennas are presented. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Radomes; Product Development

19980004907 David Sarnoff Research Center, Princeton, NJ USA

Joint Adaptive Communications System (JACS) Concept Validation Study ***Final Report, Jun. - Sep. 1996***

Newman, N. P., David Sarnoff Research Center, USA; Stiller, T., David Sarnoff Research Center, USA; Stephens, W. E., David Sarnoff Research Center, USA; Jul. 1997; 61p; In English

Contract(s)/Grant(s): F30602-96-C-0258; AF Proj. RDCN

Report No.(s): AD-A329970; RL-TR-97-37; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The Concept Validation Study of Joint Adaptive Communication System (JACS), conducted by David Sarnoff Research Center (Sarnoff) under contract to Air Force, focused on evaluation of network algorithms for a self-organizing, self-routing, self-maintaining and automatically reconfigurable communications network based on randomly scattered, inexpensive, disposable, rugged and air/ground-vehicle deployable nodes. JACS is capable of achieving the requirements of the network described above. JACS has a wide range of applications such as (a) downed pilot communications; (b) sensor array configurations; (c) special operations at the forward edge of battle; (d) tactical Internet, and (e) Ad-Hoc network communications between multiple UAV's. During this study simulation network models for JACS were developed. The test network models are operational. The call set-up and routing algorithms work. The Call Set-up performance and End-to-end packet delay performance in JACS were evaluated using the network simulation models developed. Major performance characterizations have been obtained. The JACS concept is algorithmically feasible. Next steps include expanded validation of the JACS concept with reference to related radio propagation issues, phototyping and operational validation.

DTIC

Communication Networks; Radio Communication

19980005017 National Defence Research Establishment, Avdelningen foer Styrning, Material och Undervattenssensorer, Stockholm, Sweden

Modelling of Electromagnetic ELF Scattering by Smooth 3D Objects Submerged in Water ***Topical Report***

Mattsson, J., National Defence Research Establishment, Sweden; Jun. 1997; 22p; In English

Report No.(s): PB97-208672; FOA-R-97-00519-409-SE; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The scattering of electromagnetic extremely low frequency (ELF) dipole fields by smooth perfect conducting 3D objects submerged in water is modeled in this paper. The scattered electromagnetic fields are calculated from surface integral representations. The unknown surface current on the scatterer is obtained from a second kind integral equation of magnetic types on the scattering surface. The integral equation is solved by means of a boundary element method (BEM) using quadratic basis functions and point matching. Numerical examples are given for ellipsoidally shaped objects in a whole-space of water and in a half-space of water below a half-space of air.

NTIS

Electromagnetic Scattering; Extremely Low Frequencies; Submerged Bodies; Mathematical Models

19980005134 Norwegian Defence Research Establishment, Dept. of Command and Control Warfare Technology, Kjeller, Norway

REMJA User's Manual

Klum, P., Norwegian Defence Research Establishment, Norway; Mar. 1997; 36p; In English

Report No.(s): PB97-173728; FOA-R-97-000390-616-SE; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is a user's manual for the software model REMJA. REMJA simulates the scenario created by a chaff dispensing aircraft (target), and graphs the scenario frequency doppler spectrum, which an active missile (threat) seeker would see from a far distance. The aircraft can also illuminate dispensed chaffs using an onboard repeater jammer (illuminator). REMJA can be used for answering questions how an aircraft, attacked by an active doppler guided missile: should dispense chaffs; should illuminate the chaffs; and in which threat direction angles the chaffs are effective, giving information about tactics. The model can also give hints how the dispense unit should be constructed and how the repeater jammer should work. REMJA is developed in MATLAB 4.2c.

NTIS

Surface to Air Missiles; Chaff; Dispensers; User Manuals (Computer Programs); Doppler Radar

19980005203 Naval Research Lab., Washington, DC USA

Measurement of Atmospheric Attenuation Low over the Sea Surface at 94 GHz

Lohrmann, Dieter R., Naval Research Lab., USA; Wu, David, Naval Research Lab., USA; Sep. 30, 1997; 19p; In English

Report No.(s): AD-A330224; NRL/FR/5740-97-9858; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Methods and equipment were designed to measure atmospheric attenuation low over the sea surface at W Band (94 GHz). Measurements were carried out at the NRL's Chesapeake Bay Detachment, and the results were compared with theoretical values. The method described will provide accurate ships' RCS measurements at W Band, taking into account variations of atmospheric attenuation.
DTIC
Atmospheric Attenuation; Detachment

19980005204 Ohio State Univ., ElectroScience Lab., Columbus, OH USA
A User's Manual for the General Cylinder Code (GCYL)
Kragalott, M., Ohio State Univ., USA; Newman, E. H., Ohio State Univ., USA; Jun. 1990; 140p; In English
Contract(s)/Grant(s): PO-D55951
Report No.(s): AD-A329972; ESL-722644-1; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This report serves as a users manual for the 'General Cylinder' (GCYL) code. GCYL is a user oriented computer code for analyzing the time harmonic TM or TE scattering from a general cylinder. A general cylinder is composed of open or closed perfectly conducting surfaces and/or lossy and inhomogeneous dielectric/ferrite cylinders of arbitrary cross section, as well as thin dielectric strips modeled by uniform or tapered sheet impedances. The perfectly conducting surfaces and the sheet impedance strips may contact or even penetrate the dielectric/ferrite regions. This report provides a description of the inputs and outputs of GCYL.
DTIC
User Manuals (Computer Programs); Harmonic Analysis; Cylindrical Bodies; Computer Programs

19980005224 National Telecommunications and Information Administration, Inst. for Telecommunication Sciences, Boulder, CO USA
Broadband Spectrum Survey at San Diego, California
Sanders, Frank H., National Telecommunications and Information Administration, USA; Ramsey, Bradley J., National Telecommunications and Information Administration, USA; Lawrence, Vincent S., National Telecommunications and Information Administration, USA; Dec. 1996; 125p; In English
Report No.(s): PB97-185607; NTIA-97-334; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The National Telecommunications and Information Administration (NTIA) is responsible for managing the Federal Government's use of the radio spectrum. In discharging this reponsibility, NTIA uses the Radio Spectrum Measurement System to collect data for spectrum utilization assessments. This report details such a data collection effort spanning all of the spectrum from 108 MHz to 19.7 GHz in the metropolitan area of San Diego, California during February and March of 1995.
NTIS
Broadband; Data Acquisition; Organizations; Radio Spectra; Telecommunication

19980005250 NERAC, Inc., Tolland, CT USA
Scanning Antennas: Latest citations from the INSPEC Database
May 1997; In English; Page count unavailable, Supersedes PB96-861414.
Report No.(s): PB97-860019; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning scanning antennas for communications and radar. Scanning is accomplished electronically, mechanically, or by a hybrid method using both scanning techniques. Studies include the radiation pattern characteristics, systems concepts, and applications for a variety of scanning antennas.
NTIS
Bibliographies; Steerable Antennas; Antenna Components

19980005352 Oxford Univ., Merton Coll., Oxford, UK
Lip Tracking for Audio-Visual Speech Recognition
Kaucic, Robert A., Jr., Oxford Univ., UK; Sep. 30, 1997; 168p; In English
Report No.(s): AD-A329886; AFIT-97-031; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Human speech is conveyed through both acoustic and visual channels and is therefore inherently multi-modal. Further, the two channels are largely complementary in that the acoustic signal typically contains information about the manner of articulation

while the visual signal embodies knowledge of the place of articulation. This orthogonal nature of the audio and visual components has enticed researchers to develop audio-visual speech recognition systems that have been shown to be robust to acoustic noise. A fundamental requirement of automatic audio-visual speech recognition is the need for real-time tracking; however, this necessity has been largely ignored by the lipreading community. This work presents a new approach for tracking unadorned lips in real time (50 fields/sec). The tracking framework presented combines comprehensive shape and motion models learnt from continuous speech sequences with focused image feature detection methods. Statistical models of the grey-level appearance of the mouth are shown to enable identification of the lip boundary in poorly contrasted grey-level images. The combined armory of the these modeling approaches permits robust, real-time tracking of unadorned lips. Isolated-word recognition experiments using dynamic time warping and Hidden Markov Model-based recognizers demonstrate that real-time, contour-based, lip tracking can be used to provide robust recognition of degraded speech. In noisy acoustic conditions, the performance of recognizers incorporating visual shape parameters are superior to the acoustic-only solutions, providing for error rate reductions up to 44%.
DTIC
Speech Recognition; Visual Signals; Real Time Operation; Lips (Anatomy)

19980005633 National Telecommunications and Information Administration, Inst. for Telecommunication Sciences, Boulder, CO USA
Broadband Spectrum Survey at Los Angeles, California
Sanders, F. H., National Telecommunications and Information Administration, USA; Ramsey, B. J., National Telecommunications and Information Administration, USA; Lawrence, V. S., National Telecommunications and Information Administration, USA; May 1997; 113p; In English
Report No.(s): PB97-165906; NTIA-97-336; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
The National Telecommunications and Information Administration (NTIA) is responsible for managing the Federal Government's use of the radio spectrum. In discharging this responsibility, NTIA funds the Institute for Telecommunication Sciences Radio Spectrum Measurement System to collect data for spectrum utilization assessments. This report details such a data collection effort spanning all of the spectrum from 108 MHz to 19.7 GHz in the metropolitan area of Los Angeles, California during March, April, and May 1995.
NTIS
Telecommunication; Radio Spectra; Data Acquisition; Broadband; Surveys; Electromagnetic Noise

19980005636 National Inst. for Occupational Safety and Health, Hazard Evaluations and Technical Assistance Branch, Cincinnati, OH USA
Hazard Evaluation and Technical Assistance Report HETA 95-0177-2617, Federal Occupational Health, Seattle, Washington
Moss, C. E., National Inst. for Occupational Safety and Health, USA; Esswein, E. J., National Inst. for Occupational Safety and Health, USA; Dec. 1996; 24p; In English
Report No.(s): PB97-174304; HETA-95-0177-2617; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In response to a request from the Federal Occupational Health Office in Seattle, Washington, an investigation was begun into possible hazardous exposures to microwave and radiofrequency radiation at eight US Army Corps of Engineers field stations (SIC-4899) in Washington, Idaho, and Montana. At each station, radiation measurements were taken in the equipment building, at the base of the tower, and during a 6 to 9 minute tower climb. Analysis of the data indicated that Corps of Engineers maintenance workers were not exposed to microwave radiation in the 1.7 to 1.8 gigahertz region. However, exposures above the guidelines may occur from radiofrequency sources located either on the towers or on adjacent towers not part of the Corps of Engineers projects and operated primarily in the 100 to 300 megahertz region. In and around the equipment buildings, exposures to microwave and radiofrequency radiation sources appeared to be below guidelines. The authors conclude that workers who climb towers were exposed to electric and magnetic fields which may be in excess of occupational exposure limits.
NTIS
Exposure; Magnetic Fields; Radiation Sources; Electric Fields; Hazards; Electromagnetic Fields; Radio Waves

19980005859 National Inst. of Standards and Technology, Electomagnetic Fields Div., Boulder, CO USA
Bibliography of the NIST Electromagnetic Fields Division Publications
Lyons, R. M., National Inst. of Standards and Technology, USA; Aug. 1997; 146p; In English; See also PB96-210778 and PB95-135562.
Report No.(s): PB98-104144; NISTIR-5063; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This bibliography lists the publications by the staff of the Electromagnetic Fields Division of the National Institute of Standards and Technology for the period January 1970 through July 1997. It supersedes NISTIR 5050 which listed the publications of the Electromagnetic Fields Division from January 1970 through July 1996. Selected earlier publications from the Division's predecessor organizations are included.
NTIS
Bibliographies; Electromagnetic Fields

19980006132 Technische Univ., Centre for Telematics and Information Technology, Twente, Netherlands
B-ISDN to the Cell Site Switch versus B-ISDN to the Mobile Terminal
Karagiannis, G., Technische Univ., Netherlands; Katoen, J. P., Technische Univ., Netherlands; Niemegeers, I. G. M. M., Technische Univ., Netherlands; 1997; 11p; In English; International Conference on Communications Systems, 25-26 Nov. 1996, Singapore; Sponsored by Institute of Electrical and Electronics Engineers, USA
Report No.(s): PB97-204457; CTIT-TR-96-24; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
This paper addresses in detail two possible scenarios for integrating the future mobile telecommunication system UMTS with evolving broadband fixed telecommunication system B-ISDN. In the first scenario, a mobile-specific access network is envisaged combined with a B-ISDN backbone network. The second scenario uses B-ISDN basic call facilities throughout the entire network, including the mobile access part. The two scenarios are described in detail and a comparison at functional level is made. This comparison is complemented by a performance study of a non-trivial handover procedure in a high-traffic public environment.
NTIS
Broadband; Telecommunication; Mobile Communication Systems; Packet Switching

19980006278 Hampton Univ., VA USA
Application of AWE Along with a Combined FEM/MoM Technique to Compute RCS of a Cavity-Backed Aperture in an Infinite Ground Plane Over a Frequency Range
Reddy, C.J., Hampton Univ., USA; Deshpande, M.D., Vigyan Research Associates, Inc., USA; Dec. 1997; 38p; In English
Contract(s)/Grant(s): NCC1-231; RTOP-522-11-41-02
Report No.(s): NASA/CR-97-206261; NAS 1.26:206261; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A hybrid Finite Element Method (FEM)/Method of Moments (MoM) technique in conjunction with the Asymptotic Waveform Evaluation (AWE) technique is applied to obtain radar cross section (RCS) of a cavity-backed aperture in an infinite ground plane over a frequency range. The hybrid FEM/MoM technique when applied to the cavity-backed aperture results in an integro-differential equation with electric field as the unknown variable, the electric field obtained from the solution of the integro-differential equation is expanded in Taylor series. The coefficients of the Taylor series are obtained using the frequency derivatives of the integro-differential equation formed by the hybrid FEM/MoM technique. The series is then matched via the Pade approximation to a rational polynomial, which can be used to extrapolate the electric field over a frequency range. The RCS of the cavity-backed aperture is calculated using the electric field at different frequencies. Numerical results for a rectangular cavity, a circular cavity, and a material filled cavity are presented over a frequency range. Good agreement between AWE and the exact solution over the frequency range is obtained.
Author
Method of Moments; Finite Element Method; Integral Equations; Differential Equations; Waveforms; Frequency Ranges; Electric Fields; Derivation

19980006285 Institute for Human Factors TNO, Soesterberg, Netherlands
Hearing Protection and Speech Transmission Quality of the Gentex DH-132AS/SV Headset Equipped with Active Noise Reduction *Final Report Geluidverzwakking en spraaktransmissiekwaliteit bij twee productie-exemplaren van de Gentex DH-132AS/SV actieve geluidreductie headset*
Kriekaard, J. J., Institute for Human Factors TNO, Netherlands; vanWijngaarden, S. J., Institute for Human Factors TNO, Netherlands; Jul. 14, 1997; 14p; In Dutch
Contract(s)/Grant(s): A96/KL/372
Report No.(s): TD97-0226; TM-97-A050; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, Netherlands), Hardcopy, Microfiche
By assignment of the Royal Netherlands Army, sound attenuation and speech transmission quality have been measured for the Gentex DH-132AS/SV headset equipped with active noise reduction (ANR) for use in the Leopard 2 tank. Prototypes of this headset were investigated in an earlier assignment. It was found that the speech transmission quality of the telephones, when using the headset in the Leopard 2, is adequate. With the ANR switched on, personnel may be exposed to the noise inside the Leopard

2 up to 8 hours per day, whereas the maximum exposure time is only several minutes for the Gentex DH-132AS/SV without ANR. Since the tested ANR-headsets, even with the ANR switched off, provide better speech transmission quality and sound attenuation than the passive version of the DH-132AS/SV, other factors than the ANR will also be of importance. The acoustic seals (between earcup and head) and the type of telephones are two of such factors. With one of two tested samples low-frequent oscillations occurred, which considerably reduced comfort when using the system. In practice, the possibility of occurrence of dangerously high noise levels resulting from the oscillations cannot be excluded.
Author
Earphones; Acoustic Attenuation; Noise Reduction; Noise Intensity; Tanks (Combat Vehicles)

19980006298 NERAC, Inc., Tolland, CT USA
Field Electromagnetic Shielding of Equipment, Cables, Enclosures, and Installations (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870878; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning modeling, simulation, and measurement techniques used in electromagnetic shielding of electrical and electronic equipment, cables, and enclosures. Shielding of power transmission lines, underground cables, and system interconnects is examined. References cover shielding materials, cable sheathing, earth screens, electromagnetic compatibility measurement, lightning effects on buried shield structures, shielding performance, and computational techniques. Regulations and legislation for personnel protection are included. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Electromagnetic Shielding; Electronic Equipment

19980006322 Communications Research Centre, Ottawa, Ontario Canada
Transport Flow Control and Connection Admission Policies for Reliable Applications
Lamont, Louise, Communications Research Centre, Canada; Miloucheva, Ilka, Communications Research Centre, Canada; Sterling, Wolfram, Communications Research Centre, Canada; Apr. 1996; 77p; In English
Report No.(s): AD-A330111; CRC-RP-96-007; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The purpose of this report was to determine transport protocol performance characteristics over high speed trans-Atlantic ATM connections, using national High Speed Test Networks and Teleglobe's trans-Atlantic submarine fibre CANTAT-3. The measurements focus on TCP/IP's flow control parameters and mechanisms for Quality of Service (QOS) provision (throughput, response time) to bulk data and transaction applications. Practical issues of TCP/IP over Long Fat Networks (LFN) (trans-Atlantic ATM) are investigated and compared with TCP/IP performance on ATM Local Area Networks (LANs). In order to study the QOS management of TCP/IP connections over ATM, we investigated the specific effects of performance factors such as: TCP flow control and send window size, network delay, system scheduling and application traffic. In this document we discuss the mapping of applications' QOS parameters to the ATM service classes and policies for connection admission control. We also present the performance effects of bundling or grouping transport connections over the same ATM resources. Practical considerations for mapping the traffic and QOS requirements of applications to ATM resources are discussed.
DTIC
Asynchronous Transfer Mode; Local Area Networks; Protocol (Computers); Traffic

33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry. For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

19980003915 NERAC, Inc., Tolland, CT USA
Semiconductor Chips (Latest citations from the US Patent Bibliographic File with Exemplary Claims)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851018; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the manufacture of semiconductor chips. Citations describe semiconductor chip assemblies, packages, modules, power supplies, and connections. The design of semiconductor chips used in the fabrication of semiconductor devices, printed circuits, digital scanners, ink jet printers, and electronic modules is presented. Semiconductor chip mounting, stacking, cooling, and testing are also included. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Chips (Electronics); Semiconductor Devices

19980003924 NERAC, Inc., Tolland, CT USA
Micromotors: Characteristics, Analysis, and Applications (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851257; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning speed-torque and transient characteristics, finite element and computer-aided analysis, and applications of micromotors for servo controls and electronics equipment. Topics include design and development of micromotors, rare earth micromotor magnets, micromotor brushes, electronic governor circuits, DC micromotors, optimum parameters of armatures and inductors, and micromotor selection criteria. Applications include precision instrumentation, video and audio equipment, microactuators and microrobots, electric tools, medical instruments, office and factory automation, and electronic watches. Various types of micromotors are examined, including direct current, synchronous, precision, linear control, servo, induction, integrated circuit, brushless, single phase, and hysteresis.
NTIS
Computer Techniques; Bibliographies; Phase Shift Circuits; Finite Element Method; Industrial Plants; Bioinstrumentation

19980003925 NERAC, Inc., Tolland, CT USA
Piezoelectric Transducers: Material. (Latest citations from the Ei Compendex*Plus Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-858162.
Report No.(s): PB97-851919; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning design and fabrication of piezoelectric transducers. Emphasis is placed on composites, crystals, ceramic, and piezoelectric materials. Applications in bioengineering, electronics, sound and acoustics, and light and optical technology are discussed in separate bibliographies.
NTIS
Piezoelectric Transducers; Bibliographies; Fabrication; Design Analysis

19980003926 NERAC, Inc., Tolland, CT USA
Recycling Battery Wastes. (Latest citations from the Energy Science and Technology Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-857974.
Report No.(s): PB97-851893; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning recycling of batteries and battery production wastes. Articles examine reclamation methods for lead, manganese, and other metals; the recycling of sulfuric acid wastes from batteries and their manufacture; combustion of battery scrap; smelting and electrometallurgy of battery scrap; and mercury recovery. Also reviewed are trends toward manufacturing recyclable batteries, environmental mitigation of battery production methods, and recycling of plastic scraps from batteries. Economic studies are also considered. A variety of battery types are considered including lead-acid, dry-cell, nickel-cadmium, zinc-metal, metal-gas, and other systems.
NTIS
Bibliographies; Reclamation; Electric Batteries; Waste Treatment; Technologies

19980003935 NERAC, Inc., Tolland, CT USA
Burn-In Testing of Electronic Components. (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-858576.
Report No.(s): PB97-851950; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use of burn-in processes in the testing and reliability evaluation of electronic components. Topics include descriptions of automated burn-in systems, the efficacy of burn-in processes, and early failure analyses. Economic aspects are also considered.
NTIS
Bibliographies; Semiconductor Devices; Reliability; Evaluation; Failure Analysis; Burn-In; Electronic Equipment

19980003989 NERAC, Inc., Tolland, CT USA
Electronic Heat Sinks (Latest citations from the US Patent Bibliographic File with Exemplary Claims)
Oct. 1996; In English; Page count unavailable
Report No.(s): PB97-850143; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
The bibliography contains citations of selected patents concerning heat sinks used in electronic packaging. Patents describe the design and manufacture of various heat sinks used for packaging semiconductor devices, integrated circuits, and printed circuits and circuit boards. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Heat Sinks; Electronic Packaging

19980004010 Sandia National Labs., Albuquerque, NM USA
Degradation of the materials of construction in Li-ion batteries
Braithwaite, J. W., Sandia National Labs., USA; Gonzales, A., Sandia National Labs., USA; Lucero, S. J., Sandia National Labs., USA; Mar. 1997; 30p; In English
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-97-0507; DE97-005178; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
The primary current-collector materials being used in lithium-ion cells are susceptible to environmental degradation: aluminum to pitting corrosion and copper to environmentally assisted cracking. Pitting occurs at the highly oxidizing potentials associated with the positive-electrode charge condition. However, the pitting mechanism is more complex than that typically observed in aqueous systems in that the pits are filled with a mixed metal/oxide product and exist as mounds or nodules on the surface. Electrochemical impedance spectroscopy was shown to be an effective analytical tool for quantifying and verifying aluminum corrosion behavior. Two fluorocarbon-based coatings were shown to improve the resistance of Al to pitting attack. Detailed x-ray photoelectron spectroscopy (XPS) surface analyses showed that there was very little difference in the films observed after simple immersion in either PC:DEC or EC:DMC electrolytes versus those following electrical cycling. Li and P are the predominant surface species. Finally, environmental cracking of copper can occur at or near the lithium potential and only if specific metallurgical conditions exist (work-hardening and large grain size).
DOE
Accumulators; Copper; Electric Batteries; Electrodes; Electrolytes; Fluorocarbons; Metal Ions

19980004028 Joint Inst. for Nuclear Research, Lab. of Nuclear Problems, Dubna, USSR
Circuit of automatic modulating field control for nuclear magnetometer ***Skhema avtomaticheskoj regulirovki moduliruyushchego polya dlya yadernogo magnitometra***
Ivashkevich, S. A., Joint Inst. for Nuclear Research, USSR; 1996; 6p; In Russian
Report No.(s): JINR-R-13-96-196; DE97-616191; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche
A circuit is suggested for automatic adjustment of the modulation amplitude of the magnetic field to be measured for nuclear magnetometers, and necessary range of this adjustment is determined. Depending on the measured field inhomogeneity, the circuit can smoothly vary the modulating field amplitude approximately by a factor of 30 stabilizing it at an optimal level.
DOE
Automatic Control; Magnetometers; Control; Magnetic Fields

19980004127 Missouri Univ., Dept. of Physics, Saint Louis, MO USA
Development of Advanced Electronic Materials and Devices for Ultra-Low 1/f Noise and Low Leakage Current Applications ***Final Report, 1 Jun. 1994 - 31 May 1997***
Handel, Peter H., Missouri Univ., USA; Jul. 15, 1997; 39p; In English
Contract(s)/Grant(s): F49620-94-I-0342; AF Proj. 2305

Report No.(s): AD-A329816; AFOSR-TR-97-0358; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report contains practical applications of the Quantum 1/f Effect, theory development, and contributions not directly based on quantum 1/f noise. The application to quartz resonators was improved by the inclusion of crystal defects in the calculation, and was generalized to the case of low-Q and SAW devices. The generalization is important, introducing the notion of incoherence between quantum 1/f fluctuations of the phonon loss rate in various regions of the crystal. The applications also include calculation of quantum 1/f noise in gallium nitride. It is 3-10 times lower in GaN than in GaAs. The theory was reformulated on the basis of the new negative conditional quantum entropy concept explaining the apparent entropy production in 1/f noise by simultaneous production of negative-entropy soft photon states. A long-standing conceptual difficulty is eliminated on this basis of tremendous importance is the discovery during this grant of a new method connecting the coherent and conventional quantum 1/f effects. A mass distribution was found which allows to find the quantum 1/f noise in general. A method of gate current suppression in HFET and a two-dimensional all-optical TDM system were studied.

DTIC

Quantum Theory; Surface Acoustic Wave Devices; Product Development; Quartz Transducers

19980004562 National Inst. of Standards and Technology, Gaithersburg, MD USA

NIST List of Publications LP 103. National Semiconductor Metrology Program Publications for the Years 1990-1996

Walters, J., National Inst. of Standards and Technology, USA; Mar. 1997; 116p; In English

Report No.(s): PB97-158976; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This List of Publications includes all papers relevant to semiconductor technology published by NIST staff, including work of the National Semiconductor Metrology Program, the Semiconductor Electronics Division, and other parts of NIST having independent interests in semiconductor metrology. Bibliographic information is provided for publications from 1990 through 1996. Within each year, citations of published papers are listed alphabetically by first author. Indexes are provided by topic area and by author. Publications are referred to in the Topic and Author Indexes according to publication year and citation number (i.e., 96-3 refers to the third publication in the year 1996). A listing of software available from the Semiconductor Electronics Division is given on page 66, along with contacts for additional information and for copies of the computer programs.

NTIS

Bibliographies; Research and Development; Semiconductor Devices; Documents

19980004572 NERAC, Inc., Tolland, CT USA

Electronic Heatsinks (Latest citations from the Ei Compendex*Plus Database)

Oct. 1996; In English; Page count unavailable

Report No.(s): PB97-850671; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use and design of electronic heatsinks for integrated circuits, power supplies, card cage assemblies, and computers. References consider the use of heatsinks in electronic packaging of multichip modules, microchannel, surface mount, and chip-on-board components. Applications of thermodynamics, including heat transfer, thermal resistance, algorithms and models, are discussed. The use of heatsinks in the soldering of printed circuit boards is also considered. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Heat Sinks; Bibliographies

19980004704 NERAC, Inc., Tolland, CT USA

Soldering Electronics. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)

May 1997; In English; Page count unavailable. Supersedes PB96-862560.

Report No.(s): PB97-860308; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the soldering of electronic circuits and circuit boards. References to solder resists, pastes, joints, masks, connections, interconnections, and reflow processes are presented. Citations also cover substrate surface treatment, high-density circuit soldering, soldering of surface mount components, microelectronics packaging, and solderability assessment.

NTIS

Bibliographies; Soldering; Circuit Boards; Microelectronics; Surface Treatment; Solders

19980004785 NERAC, Inc., Tolland, CT USA

High Voltage Transformers. (Latest citations from the INSPEC Database)

May 1997; In English; Page count unavailable. Supersedes PB96-863055.

Report No.(s): PB97-860456; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning materials and performance of insulators used for high voltage transformers. Topics examine use of mica-fibers, gases, mica filled epoxies, and ceramics. Effects of insulation aging are reviewed, and acceptance testing of high voltage power transformers and apparatus is also examined.

NTIS

Aging (Materials); Epoxy Resins; Transformers; Mica; Insulators; Ceramics; Bibliographies

19980004805 NERAC, Inc., Tolland, CT USA

Pyroelectric Materials and Devices. (Latest Citations from the U.S. Patent Bibliographic File with Exemplary Claims)

Jan. 1997; In English; Page count unavailable

Report No.(s): PB97-854558; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning engineering materials for use in pyroelectric devices. The design and fabrication of pyroelectric infrared detectors are presented. Citations also discuss pyroelectric thin films, ceramic materials, crystal arrays, rapid thermal response devices, millimeter imaging devices, fluid-flow indicators, and intrusion detection systems. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Pyroelectricity

19980004904 NERAC, Inc., Tolland, CT USA

Thin Film Semiconductor Devices. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)

Oct. 1996; In English; Page count unavailable.

Report No.(s): PB97-850127; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the thin film technology used in the manufacture of semiconductor devices. Techniques of forming thin film transistors, capacitors, resistors, and memory structures on semiconductor substrates are presented. Topics include highly integrated semiconductor devices, silicon and silicon oxide films, gate electrodes, gate insulation films, heat source/drain systems, resist patterns, and impurity implanting. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Semiconductor Devices; Thin Films

19980005104 Joint Inst. for Nuclear Research, Lab. of Theoretical Physics, Dubna, USSR

On a generalized oscillator system: interbasis expansions

Kibler, M., Lyon-1 Univ., France; Mardoyan, L. G., Joint Inst. for Nuclear Research, USSR; Pogosyan, G. S., Joint Inst. for Nuclear Research, USSR; 1996; 22p; In English

Report No.(s): JINR-E-2-96-242; DE97-613086; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

This article deals with a nonrelativistic quantum mechanical study of a dynamical system which generalizes the isotropic harmonic oscillator system in three dimensions. The Schroedinger equation for this generalized oscillator system is separable in spherical, cylindrical, and spheroidal (prolate and oblate) coordinates. The quantum mechanical spectrum of this system is worked out in some details. The problem of interbasis expansions of the wave functions is completely solved. The coefficients for the expansion of the cylindrical basis in terms of the spherical basis, and vice-versa, are found to be analytic continuations (to real values of their arguments) of Clebsch-Gordan coefficients for the group SU(2). The interbasis expansion coefficients for the prolate and oblate spheroidal bases in terms of the spherical or the cylindrical bases are shown to satisfy three-term recursion relations. Finally, a connection between the generalized oscillator system (projected on the z-line) and the Morse system (in one dimension) are discussed.

DOE

Schroedinger Equation; Clebsch-Gordan Coefficients; Wave Functions; Harmonic Oscillators

19980005135 Norwegian Defence Research Establishment, Kjeller, Norway

CLUSTER/ASPOC: Design of a Space Qualified High Voltage Generator

Kvernsveen, K., Norwegian Defence Research Establishment, Norway; Narheim, B., Norwegian Defence Research Establishment, Norway; Kyrkjedelen, B., Norwegian Defence Research Establishment, Norway; Mar. 13, 1997; 84p; In English

Report No.(s): PB97-174189; FFI/RAPPORT-97/00088; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This report deals with the FFI (Norwegian Defense Research Establishment) contribution to the design of a space qualified ion emitter. The emitter, denoted ASPOC (Active Spacecraft Potential Control), forms a part of the scientific payload on the CLUSTER satellites. The purpose of the ASPOC instrument is to control the CLUSTER spacecraft potential relative to the surrounding plasma. This report deals with the design of the space qualified HVG. It gives a comprehensive documentation of the HVG, containing circuit analysis and detailed functional descriptions.

NTIS

Voltage Generators; Thermionic Emitters; Satellite Control; Ion Emission

19980005136 National Defence Research Establishment, Div. of Sensor Technology, Linkoeping, Sweden

Evaluation of Tuneable MMIC Filters for Radar Applications ***Progress Report Utvaering av Avstaembara MMIC-Filter foer Radar Tillaempningar***

Danestig, M., National Defence Research Establishment, Sweden; Ouacha, A., National Defence Research Establishment, Sweden; Carlegrim, B., National Defence Research Establishment, Sweden; Tieman, T., National Defence Research Establishment, Sweden; vanVliet, F., National Defence Research Establishment, Sweden; Feb. 1997; 22p; In English

Report No.(s): PB97-174676; FOA-R-97-00435-408-SE; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Phased-array radar systems using frequency hopping, in order to avoid EMI from neighboring radar or jammers, can reject interfering signals by the the application of tunable band pass and/or band stop filter in the receiver front end of each receiver channel. Another application of tunable bandpass filter is as image frequency rejection filter in a receiver chain. This can reduce the number of mixing stages and thus significantly reduce the complexity of the receiver. Monolithic microwave in tuneable bandpass and bandstop filters are promising candidates to perform the rejection tasks mentioned above.

NTIS

Tunable Filters; Frequency Hopping; Radar Receivers; Integrated Circuits; Microwave Circuits; Radar Filters

19980005209 Newcastle Univ., Dept. of Computing Science, Newcastle, UK

Use of VHDL Environment for Interactive Synthesis of Asynchronous Circuits

Starodoubtsev, N. A., Newcastle Univ., UK; Yakovlev, A. V., Newcastle Univ., UK; Petrov, S. Y., Newcastle Univ., UK; Nov. 1995; 17p; In English

Report No.(s): PB96-150248; TRS-540; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The paper describes the idea of VHDL-based synthesis of asynchronous control circuits from Signal Transition Graphs. A set of VHDL representation forms is defined which allow the designer: to interact with the synthesis process more closely, using the full range of tools (simulation, visualization etc.) available in VHDL environments; and to transition between the forms smoothly, sometimes using 'mixed' forms, thus efficiently combining partial logic circuit implementations with event-based descriptions of the surrounding parts.

NTIS

Very Large Scale Integration; Computer Design; Logic Design

19980005210 NERAC, Inc., Tolland, CT USA

Waterproof Electric Connections: Latest citations from the US Patent Bibliographic File with Exemplary Claims

May 1997; In English; Page count unavailable, Supersedes PB96-861406.

Report No.(s): PB97-860001; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning devices and methods for making waterproof electrical connections. Connections designed for underwater installations are discussed. Applications include well pumps, lighting equipment, power transmission lines, and communication cables.

NTIS

Bibliographies; Electric Connectors; Waterproofing

19980005258 NERAC, Inc., Tolland, CT USA

Nickel Cadmium Batteries. (Latest Citations from the NTIS Bibliographic Database)

Jan. 1997; In English; Page count unavailable. Supersedes PB96-859194

Report No.(s): PB97-854533; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, fabrication, testing, and applications of nickel cadmium batteries. Considerable attention is given to the evaluation and development of these batteries for aircraft and spacecraft environments. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Nickel Cadmium Batteries

19980005262 Technische Hogeschool, Dept. of Mathematics and Computing Science, Eindhoven, Netherlands

Geometrical Effects in a Joule Heating Problem from Miniature Soldering

Rienstra, S. W., Technische Hogeschool, Netherlands; Apr. 1996; 34p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-176291; RANA-96-06; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The soldering of small, delicate electronic devices by means of a blade thermode requires the lower side of the thermode to have a uniform temperature distribution. In the study, the various aspects that determine the heat flow and the temperature distribution are analyzed, both for the dynamic and the stationary cases.

NTIS

Ohmic Dissipation; Resistance Heating; Soldering; Temperature Distribution

19980005344 Ohio State Univ., Dept. of Physics, Columbus, OH USA

New Approach to Color Variable Light-Emitting Devices Based on Conjugated Polymers

Wang, Y. Z., Ohio State Univ., USA; Gebler, D. D., Ohio State Univ., USA; Fu, D. K., Ohio State Univ., USA; Swager, T. M., Ohio State Univ., USA; Epstein, A. J., Ohio State Univ., USA; Sep. 20, 1997; 9p; In English

Contract(s)/Grant(s): N00014-95-I-0302

Report No.(s): AD-A330242; TR-P319; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Recently there have been reports on color variable light emitting devices. Here we present a new approach to such devices based on conjugated polymers. The device consists of a blend of pyridine-phenylene and thiophene-phenylene based copolymers sandwiched between two redox polymers: emeraldine base form of polyaniline and sulfonated polyaniline (SPAN). ITO and Al are used as electrodes. The devices work under either polarity of driving voltage with different colors of light being emitted from different locations, red from emitting polymer/SPAN interface under forward bias and green from bulk of the emitting polymers under reverse bias. Electroluminescence of the devices peak at 550 nm with a shoulder at 585 nm under reverse bias while they show a single peak at 665 nm under forward bias. The relative fast time response allows the rapid switch of colors and AC operation.

DTIC

Light Sources; Polymers; Electroluminescence; Copolymers

19980005612 NERAC, Inc., Tolland, CT USA

Semiconductor Light Emitting Devices. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)

Sep. 1996; In English; Page count unavailable.

Report No.(s): PB96-873658; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the design and manufacture of semiconductor light emitting devices. Methods of depositing active, cladding, energy barrier, and quantum well layers onto semiconductor substrates are presented. Applications in video and flat-panel display, optical recording and printing, illumination, and electronic devices are included. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Light Emitting Diodes; Semiconductor Devices

19980005625 NERAC, Inc., Tolland, CT USA
Capacitors: General Review. (Latest citations from the INSPEC Database)
Dec. 1996; In English; Page count unavailable.
Report No.(s): PB97-852784; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning trends, techniques, and applications of capacitors. Citations focus on current and past technologies in the capacitor industries. Specific types of capacitors are discussed in separate bibliographies. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Capacitors

19980005656 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Time Varying Kalman Filter for WAQUA
Verlaan, M., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 54p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-192660; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche

In this report, a new time varying approximate Kalman filter is described, which can be used for large systems that arise from discretizing partial differential equations (eg. WAQUA). The Reduced Rank Square Root (RRSQRT) algorithm was applied to a model, that was based on the two dimensional linearized shallow water equations. Also some tests were performed for a model that was model based on the (non-linear) shallow water equations.
NTIS
Kalman Filters; Partial Differential Equations; Flow Equations; Algorithms

19980005712 NERAC, Inc., Tolland, CT USA
High Density Packaging: Electronics (Latest citations from the Ei Compendex*Plus Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870316; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design and evaluation of high density electronics packaging. Citations discuss high performance, high flexibility, high-bandwidth, and programmable packaging technology. Automated assembly and packaging systems for large scale integrated circuits are presented. Applications in lithography, projection printing, and medical implants are examined
NTIS
Bibliographies; Packaging; Integrated Circuits; Printing; Large Scale Integration; Automatic Control; Lithography

19980005717 NERAC, Inc., Tolland, CT USA
Encapsulation of Electronic Circuits (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870464; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, and evaluation of encapsulation materials and techniques. Citations discuss the encapsulation of electronic components, integrated circuits, semiconductor devices, solar cells and arrays, detectors, and power supply devices. Topics include soldering stability, adhesion, thermal annealing, thermal conductivity, semiconductor processing, corrosion protection, and service life.
NTIS
Bibliographies; Encapsulating; Integrated Circuits; Microelectronics; Design Analysis; Evaluation; Product Development

19980005864 NERAC, Inc., Tolland, CT USA
Printed Circuit Solderability: Techniques and Materials (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870480; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning testing, evaluation, and enchancement of solderability in printed circuit manufacture. Topics include surface mounted technology, circuit reliability, surface cleaning and oxide removal, oxide reduction,

soldering defects, high reliability solder connections, and thermal cycling conditions. Coating materials and techniques for solderability preservation, protection, and improvement are examined.
NTIS
Bibliographies; Printed Circuits; Soldering; Technologies; Evaluation; Electronic Equipment Tests; Circuit Reliability

19980005865 NERAC, Inc., Tolland, CT USA
High-Performance Batteries (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-869946; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, components, testing, electrolytes, use, and safety aspects of advanced or high-performance batteries. Applications include use in space vehicles, electric vehicles, in load leveling operations, and for pulse power. The types discussed include sodium/metal chloride, sodium/sulfur, nickel/hydrogen, nickel/iron, iron/air, lithium/sulfur dioxide, and zinc halide.
NTIS
Bibliographies; Electric Batteries; Design Analysis; Product Development; Performance Tests

19980006231 NERAC, Inc., Tolland, CT USA
Schmitt Triggers (Latest citations from the US Patent Bibliographic File with Exemplary Claims)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870753; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning Schmitt trigger circuits and devices. Schmitt input and output terminals, nodes, inverters, registers, feedback capacitors, oscillators, and driver switches are described. References include applications in voltage sensors, Hall sensors, radiation detectors, proximity detection and alarm systems, and sensing of printer malfunctions. Applications also include protection of power supplies, electrical circuits, laser diodes, and synchronous machines.
NTIS
Trigger Circuits; Bibliographies; Capacitors; Oscillators; Semiconductor Lasers

34
FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling. For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.

19980003938 Purdue Univ., Aerospace Sciences Lab., West Lafayette, IN USA
Laminar-Turbulent Transition in High-Speed Compressible Boundary Layers with Curvature: Non-Zero Angle of Attack Experiments ***Final Report, 1 Jul. 1994 - 30 Jun. 1997***
Schneider, Steven P., Purdue Univ., USA; Collicott, Steven H., Purdue Univ., USA; Aug. 15, 1997; 7p; In English
Contract(s)/Grant(s): F49620-94-I-0067; F49620-94-I-0326; F49620-97-I-0037
Report No.(s): AD-A329733; AFOSR-TR-97-0399; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This grant supported the work of two additional graduate students in the area of high speed boundary layer transition. The non-zero angle of attack measurements were delayed, to reduce the risk of damaging the model, currently in use at zero angle of attack (AOA). Instead, a high sensitivity laser differential interferometer is being developed, for non-intrusive high bandwidth measurements of instability waves. Work towards the larger wind tunnel discussed in the proposal was also advanced, through measurements of the effect of elevated driver tube temperatures on the extent of quiet flow. Apparatus for placement of the elliptic cone at a 3-degree AOA has been designed; these measurements will commence on completion of the zero AOA measurements, late in 1997.
DTIC
Boundary Layer Transition; Angle of Attack; Supersonic Wind Tunnels; Laser Interferometry

19980003993 Tokyo Univ., Nuclear Engineering Research Lab., Tokai, Japan

Report of 2nd workshop on particle process. A report of the Yayoi study meeting

Sep. 1997; 66p; In Japanese; In English; 2nd; Workshop on Particle Process, 7 Aug. 1996, Tokyo, Japan

Report No.(s): UTNL-R-0344; CONF-9608198; DE97-739644; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In Nuclear Engineering Research Laboratory, Faculty of Engineering, University of Tokyo, a short term research named Yayoi Research Group, as a joint application research work of nuclear reactor (Yayoi) and electron Linac in Japan, has been held more than 10 times a year. This report is arranged the summaries of 'Research on Particle Method', one of them, held on August 7, 1996. As named 'Particle Method' here, the method explaining and calculating the fluids and powders as a group of particles is more suitable for treating a problem with boundary face and a large deformation of the fluids on comparison with the conventional method using lattice, which is more expectable in future development. In this report, the following studies are contained; (1) Stress analysis without necessary of element breakdown, (2) Local interpolation differential operator method and nonstructural lattice, (3) Selforganized simulation of the dynamical construction, (4) A lattice BGK solution of laminar flow over a background facing step, (5) Numerical analysis of solid-gas two phase flow using discrete element method, (6) Application of flow analysis technique to power generation plant equipments, (7) Corrision wave captured flow calculation using the particle method, and (8) Analysis of complex problem on thermal flow using the particle (MPS) method.

DOE

Stress Analysis; Fluid Flow; Numerical Analysis; Linear Accelerators; Reactor Technology; Nuclear Reactors

19980004037 Center for Mathematics and Computer Science, Dept. of Analysis, Algebra and Geometry, Amsterdam, Netherlands

Multigrid Methods for High-Order Accurate Fully Implicit Simulation of Flow in Porous Media

Molenaar, J., Center for Mathematics and Computer Science, Netherlands; May 1996; 13p; In English; Figures in this document may not be legible in microfiche; See also PB96-206511.

Report No.(s): PB97-176192; CWI-AM-R9605; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

High-order accurate finite difference schemes are widely used to avoid the detrimental effects of numerical diffusion in first-order upwind schemes. If an implicit time integration scheme is employed, the authors have to solve large systems of nonlinear equations in every time step. In this paper, the authors consider the use of multigrid methods for the iterative solutions of these systems of equations. The authors consider both a direct multigrid approach and a defect correction approach, in which only first-order accurate discretized problems have to be solved. The memory requirements are moderate, and very fine grid simulations are feasible on a standard workstation.

NTIS

Numerical Flow Visualization; Flow Equations; Porous Materials; Porosity; Finite Difference Theory; Nonlinear Equations; Upwind Schemes (Mathematics); Multigrid Methods

19980004049 NERAC, Inc., Tolland, CT USA

Flow Visualization. (Latest citations from the NTIS Bibliographic Database)

Nov. 1996; In English; Page count unavailable. Supersedes PB96-856067.

Report No.(s): PB97-851760; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning flow visualization techniques used in fluid dynamic and aerodynamic studies. The use of smoke, water vapor, dyes, and particles in general for flow visualization is examined. Citations pertaining to holographic theory and recording techniques are covered in a separate bibliography.

NTIS

Bibliographies; Flow Visualization; Fluid Flow

19980004071 Nuclear Energy Agency, Committee on the Safety of Nuclear Installations, Paris, France

Report on round robin activities on the calculation of crack opening behaviour and leak rates for small bore piping components

Grebner, H., Gesellschaft fuer Reaktorsicherheit, Germany; Hoefler, A., Gesellschaft fuer Reaktorsicherheit, Germany; Schulz, H., Gesellschaft fuer Reaktorsicherheit, Germany; Mar. 1995; 67p; In English

Report No.(s): NEA-CSNI-R-95-4; DE97-620198; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

Results of a bench mark test on crack opening and leak rate calculation are presented. The bench mark test is based on two experiments performed in phase III of the german HDR-Safety-Program which was sponsored by the German Federal Minister

of Research and Technology (BMFT). The pipes considered in these experiments were a straight pipe with 80 mm diameter and a circumferential through wall crack as well as a pipe branch with a crack in the weldment between nozzle and main pipe. Both test pieces were made of austenitic steel and loaded by internal pressure and varying bending moment. The round robin was initiated by Principal Working Group No.3 (PWG-3) of the committee on the Safety of Nuclear Installations (CSNI), witch is part of OECD (Organization for Economic Cooperation and Development)'s Nuclear Energy Agency (NEA). Scientists of five institutions in four countries (Canada, USA, Czech Republic and Germany) participated in the bench mark test. For the evolution of the crack opening either analytical methods, estimation schemes or the finite element method were used, while leak rates were calculated by means of two-phase flow models. The compilation of the results shows very large scatter bands in general, with deviations equally large between the calculations of the different participants and the calculation and the measurements. to identify reasons for this scatter - probably originating from differences between the methods used and from uncertainties in the experiment - in detail, further evaluations were made meanwhile. These are described in chapter 9, witch is added to the draft report of June 1993 of the first phase.
DOE
Austenitic Stainless Steels; Cracks; Economic Development; Internal Pressure; Mathematical Models; Two Phase Flow; Welded Joints

19980004099 Polish Academy of Sciences, Center of Mechanics, Warsaw, Poland
Experimental Validation of Numerical Codes in Thermally Driven Flows
Kowalewski, Tomasz A., Polish Academy of Sciences, Poland; Apr. 1997; ISSN 0208-5658; 19p; In English; International Symposium on Advances in Computational Heat Transfer CHT-97, 26-30 May 1997, Cesme, Turkey; Original contains color illustrations
Contract(s)/Grant(s): KBN-3-P404-001-07; Copyright; Avail: Issuing Activity (Polish Academy of Sciences, Center of Mechanics, IPPT PAN, PL 00-049, Warszawa, Poland), Hardcopy, Microfiche

The focus of this review is application of modem full field experimental techniques based on the digital image analysis in verifying and validating numerical solutions of thermally driven flows. Digital Particle Image Velocimetry and Thermometry, the new experimental methods based on a computational analysis of the colour and displacement of liquid crystal tracers, was used to obtain quantitative 2-D temperature and velocity fields information. The paths of the individual tracers obtained using 3-D digital particle tracking helped to understand and verify the flow structure. Laminar natural convection of liquids in small cube-shaped cavities, with and without phase change was studied experimentally and compared with numerical predictions. Implications arising from simplifications present in the numerical models are discussed.
Author
Image Analysis; Numerical Analysis; Particle Image Velocimetry; Liquid Crystals; Velocity Distribution; Temperature Measurement

19980004115 Louisiana Tech Univ., Ruston, LA USA
Evaluation of the Eigenvalues of the Graetz Problem in Slip-Flow
Wang, Xian-Ming, Louisiana Tech Univ., USA; Ameel, Timothy A., Louisiana Tech Univ., USA; Warrington, Robert O., Louisiana Tech Univ., USA; Sep. 14, 1997; 100p; In English
Contract(s)/Grant(s): DAAH04-94-G-0348
Report No.(s): AD-A329819; ARO-33844.4-PH-DPS; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

The objective of this research was to develop a new technique for evaluation of the eigenvalues of the Graetz problem in slip-flow - a heat transfer problem for gases at low pressures or in extremely small geometries. In this investigation, the velocity distribution with slip-flow has been obtained, expressed simply in terms of Knudsen (Kn) numbers. The expression shows that the velocity always increases as the Knudsen number increases. The relationship of Kn and molecular mean free path for a gas shows that Kn may become large enough to significantly affect the velocity distribution and consequently affect the heat transfer properties. A mathematical model of temperature distribution was established by combining the energy and momentum equations. A series solution was obtained by the method of Frobenius. Also, expressions for the local and overall Nusselt numbers were derived. All these expressions can be taken as functions of Knudsen numbers and Graetz numbers. A new technique for evaluation of eigenvalues for the solution of the Graetz problem in slip-flow was developed. This method was based on the construction of a matrix. The computational results show that it is an effective method, and the lowest five values were found for Kn from 0.02 to 0.12. For practical calculations, relationships between eigenvalues and Knudsen numbers were obtained.
DTIC
Eigenvalues; Slip Flow; Heat Transfer; Velocity Distribution; Knudsen Flow

19980004547 Saclay Research Centre, Dept. de Mecanique et de Technologie, Gif-sur-Yvette, France

An implicit second order numerical method for two-fluid models

Toumi, I., Saclay Research Centre, France; 1995; 6p; In English; 3rd; International Conference on Nuclear Engineering, 23-27 Apr. 1995, Kyoto, Japan

Report No.(s): CEA-CONF-12332; CONF-950426; DE97-620569; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

We present an implicit upwind numerical method for a six equation two-fluid model based on a linearized Riemann solver. The construction of this approximate Riemann solver uses an extension of Roe's scheme. Extension to second order accurate method is achieved using a piecewise linear approximation of the solution and a slope limiter method. For advancing in time, a linearized implicit integrating accurate non-oscillating solutions for two-phase flow calculations. The scheme was applied both to shock tube problems and to standard tests for two-fluid codes.

DOE

Two Phase Flow; Flow Characteristics; Models; Cauchy Problem

19980004570 Lockheed Martin Astronautics, Flight Systems Div., Denver, CO USA

Membrane Transport Phenomena (MTP) ***Semiannual Report, Jun. 1997 - Oct. 1997***

Mason, Larry W., Lockheed Martin Astronautics, USA; 1997; 17p; In English

Contract(s)/Grant(s): NAS8-40633

Report No.(s): NASA/CR-97-113013; NAS 1.26:113013; MCR-96-1303-Issue-04; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The activities during the fourth semi-annual period of the MTP project have involved the completion of the Science Concept Review (SCR) presentation and peer review, continuation of analyses for the mass transfer coefficients measured from MTA experiment data, and development of the second generation (MTP-II) instrument. The SCR panel members were generated several recommendations for the MTP project recommendations are : Table 1 Summary of Primary SCR Panel Recommendations (1) Continue and refine development of mass transfer coefficient analyses (2) Refine and upgrade analytical modeling associated with the MTP experiment. (3) Increase resolution of measurements in proximity of the membrane interface. (4) Shift emphasis to measurement of coupled transport effects (i.e., development of MTP phase II experiment concept).

Derived from text

Transport Properties; Membranes; Mathematical Models; Mass Transfer

19980004660 Department of the Navy, Washington, DC USA

Multi-Stage System for Microbubble Production

Stanford, Matthew J., Inventor, Department of the Navy, USA; Jun. 19, 1997; 13p; In English

Contract(s)/Grant(s): APT-APPL-879 120

Patent Info.: US-Patent-Appl-SN-879120

Report No.(s): AD-D018589; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

The invention relates generally to the production of gas microbubbles in a liquid, and more particularly to a multi-stage microbubble production system for generating gas microbubbles having diameters of approximately 100 micrometers (microns) or less.

DTIC

Gas Flow; Bubbles

19980004711 Electricite de France, Clamart, France

Implementation of 3-D second moment closure turbulence model for incompressible flows in the industrial finite element code N3S

Pot, G., Electricite de France, France; Laurence, D., Electricite de France, France; Rharif, N. E., Electricite de France, France; Lealdesousa, L., Electricite de France, France; Compe, C., Electricite de France, France; Dec. 1995; 15p; In English

Report No.(s): EDF-96-NB-00123; DE97-620571; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

This paper deals with the introduction of a second moment closure turbulence model (Reynolds Stress Model) in an industrial finite element code, N3S, developed at Electricite de France.The numerical implementation of the model in N3S will be detailed in 2D and 3D. Some details are given concerning finite element computations and solvers. Then, some results will be given, including a comparison between standard k-(epsilon) model, R.S.M. model and experimental data for some test case.

DOE

Finite Element Method; Turbulent Flow; Computer Programming

19980004801 Japan Atomic Energy Research Inst., Tokai, Japan

Study on transition between heat conduction and convection using particle methods

Watanabe, Tadashi, Japan Atomic Energy Research Inst., Japan; Kaburaki, Hideo, Japan Atomic Energy Research Inst., Japan; Sep. 1996; 56p; In Japanese

Report No.(s): JAERI-Research-96-046; DE97-729531; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The Rayleigh-Benard system is simulated using the direct simulation Monte Carlo method and the molecular dynamics method, which are the representative particle methods, and the transition phenomena between heat conduction and convection is studied from the microscopic level. The critical Rayleigh number obtained by the direct simulation Monte Carlo method, which is a statistical technique, agrees with that obtained by the linear stability analysis of hydrodynamic equations, and it is shown that the macroscopic flow instability can be studied quantitatively using the microscopic particle method. The correlations of fluctuations of temperature and velocity are found to grow at the transition in comparison with those at obvious conduction or convection states. The motions of atoms are studied using the molecular dynamics method, which is a deterministic technique, in terms of Lyapunov exponents. It is found that the chaotic motions of atoms are increased when the convection rolls, which are large-scale ordered motions of atoms, appear in the flow field.

DOE

Molecular Dynamics; Models; Thermal Conductivity; Experimentation

19980005106 Electricite de France, Lab. National d'Hydraulique, Chatou, France

Direct numerical simulation and modeling of turbulent natural convection in a vertical differentially heated slot ***Simulation numerique directe et modelisation de la convection naturelle turbulente dans un canal differentiellement chauffe***

Boudjemadi, R., Electricite de France, France; Mar. 1996; 329p; In French

Report No.(s): EDF-96-NB-00127; DE97-612686; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

The main objectives of this thesis are the direct numerical simulation of natural convection in a vertical differentially heated slot and the improvements of second-order turbulence modelling. A three-dimensional direct numerical simulation code has been developed in order to gain a better understanding of turbulence properties in natural convection flows. This code has been validated in several physical configurations: non-stratified natural convection flows (conduction solution), stratified natural convection flows (double boundary layer solution), transitional and turbulent Poiseuille flows. For the conduction solution, the turbulent regime was reached at a Rayleigh number of 1*10(sup 5) and 5.4*10(sup 5). A detailed analysis of these results has revealed the principal qualities of the available models but has also pointed our their shortcomings. This data base has been used in order to improve the triple correlations transport models and to select the turbulent time scales suitable for such flows.

DOE

Boundary Layers; Direct Numerical Simulation; Laminar Flow; Rayleigh Number; Turbulence; Turbulent Flow

19980005201 Technische Univ., Dept. of Mathematics and Computing Science, Eindhoven, Netherlands

Existence Results for the Quasistationary Motion of a Free Capillary Liquid Drop

Guenther, M., Technische Univ., Netherlands; Prokert, G., Technische Univ., Netherlands; Jan. 1996; 62p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-176333; RANA-96-01; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

We consider instationary creeping flow of a viscous liquid drop with free boundary driven by surface tension. This yields a nonlocal surface motion law involving the solution of the Stokes equations with Neumann boundary conditions given by the curvature of the boundary. The surface motion law is locally reformulated as a fully nonlinear parabolic (pseudodifferential) equations on a smooth manifold. Using analytic expansions, invariance properties, and a priori estimates we give, under suitable presumptions, a short-time existence and uniqueness proof for the solution of this equation in Sobolev spaces of sufficiently high order. Moreover, it is shown that if the initial shape of the drop is near the ball then the evolution problem has a solution for all positive times wich exponentially decays to the ball.

NTIS

Drops (Liquids); Estimates; Free Boundaries; Interfacial Tension; Manifolds (Mathematics); Neumann Problem; Nonlinear Equations; Parabolic Differential Equations

19980005861 NERAC, Inc., Tolland, CT USA

Drag Reducing Fluids (Latest citations from the NTIS Bibliographic Database)

May 1996; In English; Page count unavailable

Report No.(s): PB96-869979; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning drag reducing fluids. Studies on elastohydrodynamics are presented. Theory, chemical formulations, and applications are included.

NTIS

Bibliographies; Viscous Drag; Chemical Reactions; Numerical Analysis; Fluid Dynamics

19980006276 Institute for Computer Applications in Science and Engineering, Hampton, VA USA

The Dissipation Rate Transport Equation and Subgrid-Scale Models in Rotating Turbulence ***Final Report***

Rubinstein, Robert, Institute for Computer Applications in Science and Engineering, USA; Ye, Zhou, Institute for Computer Applications in Science and Engineering, USA; Nov. 1997; 16p; In English

Contract(s)/Grant(s): NAS1-19480; RTOP 505-90-52-01

Report No.(s): NASA/CR-97-206250; NAS 1.26:206250; ICASE-97-63; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The dissipation rate transport equation remains the most uncertain part of turbulence modeling. The difficulties arc increased when external agencies like rotation prevent straightforward dimensional analysis from determining the correct form of the modelled equation. In this work, the dissipation rate transport equation and subgrid scale models for rotating turbulence are derived from an analytical statistical theory of rotating turbulence. In the strong rotation limit, the theory predicts a turbulent steady state in which the inertial range energy spectrum scales as k(sup -2) and the turbulent time scale is the inverse rotation rate. This scaling has been derived previously by heuristic arguments.

Author

Turbulence Models; Dimensional Analysis; Mathematical Models; Statistical Analysis; Rotation; Transport Properties

19980006277 Institute for Computer Applications in Science and Engineering, Hampton, VA USA

On the Behavior of Velocity Fluctuations in Rapidly Rotating Flows ***Final Report***

Girimaji, S. S., Institute for Computer Applications in Science and Engineering, USA; Ristorcelli, J. R., Institute for Computer Applications in Science and Engineering, USA; Nov. 1997; 22p; In English

Contract(s)/Grant(s): NAS1-97046; NAS1-19480; RTOP 505-90-52-01

Report No.(s): NASA/CR-97-206244; NAS 1.26:206244; ICASE-97-58; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The behavior of velocity fluctuations subjected to rapid rotation is examined. The rapid rotation considered is any arbitrary combination of two basic forms of rotation, reference frame rotation and mean flow rotation. It is recognized that the two types of rotating flows differ in the manner in which the fluctuating fields are advected. The first category is comprised of flows in rotating systems of which synoptic scale geophysical flows are a good example. In this class of flows the fluctuating velocity field advects and rotates with the mean flow. In the rapid rotation limit, the Taylor-Proudman theorem describes the behavior of this class of fluctuations. Velocity fluctuations that are advected without rotation by the mean flow constitute the second category which includes vortical flows of aerodynamic interest. The Taylor-Proudman theorem is not pertinent to I his class flows and a new result appropriate to this second category of fluctuations is derived. The present development demonstrates that the fluctuating velocity fields are rendered two-dimensional and horizontally non-divergent in the limit of any large combination of reference frame rotation and mean-flow rotation. The concommitant 'geostrophic' balance of the momentum equation is, however, dependent upon the form of rapid rotation. It is also demonstrated that the evolution equations of a two-dimensional fluctuating velocity fields are frame-indifferent with any imposed mean-flow rotation. The analyses and results of this paper highlight many fundamental aspects of rotating flows and have important consequences for their turbulence closures in inertial and non-inertial frames.

Author

Vortices; Turbulence; Geophysics; Momentum; Rotation; Velocity Distribution; Taylor Series

19980006294 Louisiana Tech Univ., Ruston, LA USA

Heat Transfer in Microchannels

Wang, Xian-Ming, Louisiana Tech Univ., USA; Ameel, Timothy A., Louisiana Tech Univ., USA; Warrington, Robert O., Louisiana Tech Univ., USA; Sep. 14, 1997; 134p; In English

Contract(s)/Grant(s): DAAH04-94-G-0348

Report No.(s): AD-A329854; ARO-33844.2-PH-DPS; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The objective of this research was to develop an analytical solution to the heat transfer problem in microchannels with slip-flow and an isothermal wall, a heat transfer problem for gases at low pressures or in extremely small geometries, and to verify

this solution experimentally. In this investigation, an analytical expression for the velocity distribution with slip-flow was obtained which involved the Knudsen number Kn in an infinite series form. Kn for extremely small channels may become large enough to significantly affect the velocity distribution and consequently affect the heat transfer properties. A mathematical model of temperature distribution was established by combining the energy and momentum equations. A new technique for evaluation of eigenvalues for the solution of the heat transfer problem in microchannels was developed from the method of Frobenius. The computational results show that the method is effective. The local and average Nusselt numbers were found for 0.005
DTIC

Aspect Ratio; Heat Transfer; Mathematical Models; Microchannels; Momentum Theory; Nusselt Number; Temperature Distribution; Thermodynamic Properties; Velocity Distribution

35
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see 43 Earth Resources and Remote Sensing. For related information see also 06 Aircraft Instrumentation, and 19 Space Instrumentation.

19980004004 Patent and Trademark Office, Washington, DC USA
US Patent Classification Definitions. Class 355: Photocopying
Dec. 1996; 26p; In English
Report No.(s): PB97-205116; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This defines copying camera or projection printer apparatus for projecting an image of an original, by passing light through or around the original or reflecting light from the original, onto a photosensitive recording surface for the purpose of making a copy of the original. The image is usually enlarged or reduced in size with reference to the original.
NTIS
Reproduction (Copying); Patents; Classifications; Photographic Equipment

19980004088 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Control Considerations for the Scanning Tunnelling Microscope
Banning, R., Technische Univ., Netherlands; de Koning, W. L., Technische Univ., Netherlands; Adriaens, J. M. T. A., Technische Univ., Netherlands; Heerens, W. C., Technische Univ., Netherlands; Koops, K. R., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 23p; In English
Report No.(s): PB97-208250; Rept-96-151; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In a situation where both the instrument, i.e. the Scanning Tunnelling Microscope, and its control system are to be newly designed, a pulling together of available know-how is guaranteed to maximize the product. In this report, the control perspective on the carefully balanced overall proposal regarding mechanical design limitations, real-time control issues, as well as modelling and control consideration, is presented.
NTIS
Microscopes; Mechanical Engineering; Design Analysis; Active Control

19980004104 National Aerospace Lab., Aerodynamics Div., Amsterdam, Netherlands
Correction Technique for Gravity Sensing Inclinometers. Phase 1. Theoretical Analysis
Fuykschot, P. H., National Aerospace Lab., Netherlands; Oct. 20, 1995; 17p; In English; Semi-Annual Meeting of the Supersonic Tunnel Association (83rd), 2-4 Apr. 1995, Naval Surface Warfare Center, MD, USA
Report No.(s): PB97-194609; NLR-TP-95534-U; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The report proposes and theoretically analyses a remarkably simple technique for compensating the output of a gravity sensing inclinometer used in windtunnel models for errors due to centrifugal accelerations. The latter are caused by various and combined vibrational modes of the model-balance-sting-support combination which are excited during wind-on conditions. The resulting errors can exceed the required accuracy of incidence measurement of .01 deg by one or two orders of magnitude. The proposed compensation is simple and straightforward, requires a minimum of model instrumentation and can be applied in real-time.
NTIS
Error Analysis; Wind Tunnel Apparatus; Instrument Compensation; Numerical Analysis; Gravitation

19980004110 Vatell Corp., Christiansburg, VA USA

High Temperature Sensors and Arrays for Turbomachines ***Annual Report No. 3, 1 Sep. 1996 - 31 Aug. 1997***

Langley, Lawrence W., Vatell Corp., USA; Sep. 01, 1997; 16p; In English

Contract(s)/Grant(s): F49620-95-C-0041

Report No.(s): AD-A330479; AFOSR-TR-97-0521; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of this program was to create an apparatus and method for laser chemical vapor deposition (LCVD) of sensors in vacuum under control of a multi-axis positioning system. The system will be used to deposit sensors directly on the curved surfaces of turbine blades, which are insulated beforehand with a sputtered layer of alumina, 20 to 40 microns thick. This system embodies several departures from conventional LCVD. A continuous laser is employed instead of a pulsed laser, to improve the consistency and rate of deposition. The evaporation chamber is inside the vacuum chamber and closely coupled to the nozzle which floods the laser focal point. The entire vapor path is heated, with the objective of improving the speed and efficiency of vapor conversion to deposited metal. Unconverted vapor is scavenged by a carrier flow of inert gas before it can enter the main chamber.

DTIC

Vapor Deposition; Temperature Sensors; Continuous Wave Lasers; Turbomachinery; Laser Deposition

19980004176 NERAC, Inc., Tolland, CT USA

Superresolution. Technology and Applications: Latest citations from the INSPEC Database

Jun. 1996; In English; Page count unavailable.

Report No.(s): PB96-868617; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use and limitations of superresolution. Citations focus on signal processing, signal separation and synthesis, sensitivity analysis, high density recording, and quality assessment. Topics cover optical and electronic filtering, domain stability, focusing characteristics, algorithms, and modeling. Applications in optical disk systems, confocal microscopy, classification of aerospace targets, and lithography are discussed.

NTIS

Bibliographies; Technology Utilization; Signal Processing; Microscopy; Classifications; Algorithms; Optical Disks

19980004528 Fermi National Accelerator Lab., Batavia, IL USA

The SVX II silicon vertex detector at CDF

Worm, S., New Mexico Univ., USA; Sep. 1996; 6p; In English; Division of Particles and Fields, 10-15 Aug. 1996, Minneapolis, MN, USA; Sponsored by American Physical Society, USA

Contract(s)/Grant(s): DE-AC02-76CH-03000

Report No.(s): FNAL/C-96/303-E; CONF-960812-57; DE96-050557; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The CDF silicon vertex detector is being upgraded for use in Run 2 of the Fermilab collider. The increased luminosity in Run 2, coupled with the desire for increased acceptance and secondary vertex triggering, necessitates a complete redesign of the previous generation tracker. Details of the design are described.

DOE

Design; Semiconductors (Materials)

19980004701 Sandia National Labs., Albuquerque, NM USA

Gas sensing with acoustic devices

Martin, S. J., Sandia National Labs., USA; Frye, G. C., Sandia National Labs., USA; Spates, J. J., Ktech Corp., USA; Butler, M. A., Sandia National Labs., USA; [1996]; 43p; In English; Ultrasonics Symposium, 3-6 Nov. 1996, San Antonio, TX, USA

Contract(s)/Grant(s): DE-AC04-94AL-85000

Report No.(s): SAND-96-2937C; CONF-9611113-1; DE97-001889; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

A survey is made of acoustic devices that are suitable as gas and vapor sensors. This survey focuses on attributes such as operating frequency, mass sensitivity, quality factor (Q), and their ability to be fabricated on a semiconductor substrate to allow integration with electronic circuitry. The treatment of the device surface with chemically-sensitive films to detect species of interest is discussed. Strategies for improving discrimination are described, including sensor arrays and species concentration and separation

schemes. The advantages and disadvantages of integrating sensors with microelectronics are considered, along with the effect on sensitivity of scaling acoustic gas sensors to smaller size.
DOE
Acoustics; Fabrication; Gas Analysis; Gas Detectors; Microelectronics; Remote Sensing; Semiconductors (Materials); Signal Detectors

19980004756 Oak Ridge National Lab., TN USA
Integrated constant-fraction discriminator shaping techniques for the PHENIX lead-scintillator calorimeter
Jackson, R. G., Tennessee Univ., USA; Blalock, T. V., Tennessee Univ., USA; Simpson, M. L., Oak Ridge National Lab., USA; Wintenberg, A. L., Oak Ridge National Lab., USA; Young, G. R., Oak Ridge National Lab., USA; [1996]; 6p; In English; IEEE Nuclear Science Symposium and Medical Imaging Conference, 2-9 Nov. 1996, Anaheim, CA, USA
Contract(s)/Grant(s): DE-AC05-96OR-22464
Report No.(s): CONF-961123-6; DE97-001342; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The suitability of several on-chip constant-fraction discriminator (CFD) shaping methods for use in the multichannel PHENIX Lead- Scintillator detector has been investigated. Three CFD circuits utilizing a distributed R-C delay-line, a lumped-element R-C delay- line and the Nowlin shaping method have been realized in a standard 1. 2-(mu) n- well CMOS process. A CFD using ideal delay-line shaping was also studied for comparison. Time walk for 5 ns risetime input signals over a dynamic range of - 2 V to - 20 mV was less than (+-) 175 ps, (+-) 150 ps, (+-) 150, and (+-) 185 ps while worst case rms timing jitter measured 85 ps, 90 ps, 100 ps, and 65 ps, respectively, for the four methods mentioned above. Area requirements for the three candidate methods tested including the fraction circuit were 172 (mu) X 70 (mu), 160 (mu) X 65 (mu), 179 (mu) X 53 g, respectively. The fraction circuit area for the external delay-line circuit was 67 (mu) X 65 (mu). Each shaping method studied consumed no power from the dc supply.
DOE
Scintillation Counters; Circuits; CMOS

19980004787 NERAC, Inc., Tolland, CT USA
Infrared Cameras. (Latest citations from the INSPEC Database)
May 1997; In English; Page count unavailable. Supersedes PB96-862693.
Report No.(s): PB97-860365; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning applications of infrared cameras. Uses in telescoping, calorimetric measurements, deformation studies, thermal-wave phenomena, and temperature measurements are described. Also referenced is use to image the heating effect of radio frequency applicators. The application in accelerated environmental stress screening and reliability growth testing of the B-52 infrared camera is also considered.
NTIS
B-52 Aircraft; Bibliographies; Infrared Radiation; Radio Frequencies; Calorimeters; Temperature Effects

19980004795 National Defence Research Establishment, Avdelningen foer Sensorteknik, Stockholm, Sweden
Novel Method for Demodulation and Linearization of the Output Signal from a Fibre Optic Interferometer ***Ny Metod foer Demodulering och Linjaerisering av Utsignalen fran en Fiberoptisk Interferometer***
Kullander, F., National Defence Research Establishment, Sweden; Gruffman, S., National Defence Research Establishment, Sweden; Laurent, C., National Defence Research Establishment, Sweden; Zyra, S., National Defence Research Establishment, Sweden; Oct. 1996; 50p; In Swedish
Report No.(s): PB97-128300; FOA-R-96-00305-3.1-SE; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

A novel method for demodulation and linearization of the output signal from fiber-optic interferometers is described. The method has been developed to allow for detection of weak signals using all-optical sensor heads, i.e. sensor heads without electrical components. Sound pressure and magnetic fields are examples of signals that can be measured. Simultaneous registration of slow variations of high relative amplitude is also made possible, e.g. a pressure sensor that measures static pressure and acoustic signals at the same time can be constructed. The method may be realized as an electronic circuit, connected to the outputs of the fiber optic interferometer. The interferometer is arranged to provide phase-shifted signals at its outputs. In particular, a 3(star)3 coupler with three 120 degree phase-shifted intensity signals can be used. The circuit, according to the method, transforms the information in the modulated intensity signals to two output signals, one of which tracks slow variations of large amplitude while

the other detects small signals at frequencies above a lower limit. The main purpose is to enable linear demodulation of small phase signals independent of the principal interferometer phase. Besides this, the circuit can distinguish phase dependent signals from visibility dependent variations, which is necessary unless the visibility of the interferometer is stable.
NTIS
Fiber Optics; Demodulators; Optical Measuring Instruments; Interferometers; Linearization; Signal Detection

19980004817 NERAC, Inc., Tolland, CT USA
Holography. Theory, Recording Techniques, and Applications: Latest citations from the NTIS Bibliographic Database
Jun. 1996; In English; Page count unavailable, Supersedes PB95-867248.
Report No.(s): PB96-871140; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning holographic theory, recording techniques, and assessment of equipment and materials. References examine holographic interferometry, color and x-ray holography, surface relief gratings on polymeric films, light-in-flight recording, and holographic neural networks. Applications in aerospace instrumentation, high speed photography, the study of heat transfer in heat exchangers, nondestructive materials testing, information data storage, and medical diagnosis are included. Flow visualization and acoustic holography are covered in separate bibliographies.
NTIS
Holography; Bibliographies; Holographic Interferometry; X Rays; Polymeric Films; Acoustical Holography

19980004821 NERAC, Inc., Tolland, CT USA
Sensor Fusion: Information Integration from Multi-Sensor Systems. (Latest citations from the INSPEC Database)
Oct. 1996; In English; Page count unavailable. Supersedes PB96-853122.
Report No.(s): PB97-850309; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and application of sensor fusion technology in a variety of disciplines. Architecture and algorithm descriptions, decision theory aspects, and hardware and software development are among the topics discussed. Applications in target recognition, robotics, and computer vision are included. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Multisensor Fusion

19980005021 Southwest Research Inst., Mechanical and Fluids Engineering Div., San Antonio, TX USA
Metering Research Facility Program: Review of Field Meter Provers ***Topical Report, Oct. 1993 - Sep. 1994***
Park, J. T., Southwest Research Inst., USA; Behring, K. A., Southwest Research Inst., USA; Krueger, P. J., Southwest Research Inst., USA; Dec. 1995; 149p; In English
Report No.(s): PB96-146550; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Field meter provers are flowmeters for verification of the performance of field meter stations in the natural gas industry. This report is a review of the current technology for field meter provers at large volume flow rates and high pressure. The review includes a literature review of over 100 documents, an analysis of the provers performance, and a quantitative uncertainty analysis. Field meter provers may either be a permanent installation or a portable device mounted on a truck or trailer. The most viable devices for field proving are the gas piston prover, sonic nozzle, and turbine meter.
NTIS
Flowmeters; Industries; Natural Gas; Quantitative Analysis; Research Facilities

19980005119 Stanford Univ., Edward L. Ginzton Lab., Stanford, CA USA
Sensors for In-Situ Process Monitoring and Process Control ***Final Report, 15 Sep. 1993 - 14 Sep 1996***
Khuri-Yakub, B. T., Stanford Univ., USA; Saraswat, Krishna C., Stanford Univ., USA; Sep. 1996; 31p; In English
Contract(s)/Grant(s): F49620-93-I-0592
Report No.(s): AD-A329734; GL-5497; AFOSR-TR-97-0421; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report presents the results of the development of an ultrasonic sensor for in-situ monitoring of silicon wafer temperature. The sensor is based on the measurement of the velocity of ultrasonic Lamb waves in the wafer, and relating this velocity to temperature. We present a method for efficient excitation and detection of Lamb waves in the wafer, a theoretical model for relating the variation of velocity as a function of temperature, and an electronic implementation for the sensor. Our results indicate the ability

to measure the temperature with an accuracy of 10C in most integrated circuit processing environments. The sensor has also been used in a tomographic configuration to allow the measurement of spatial distribution of temperature. Finally, we highlight the potential for simultaneous measurement of temperature and film thickness in-situ.
DTIC
Mathematical Models; Silicon; Spatial Distribution; Temperature Measurement; Tomography; Ultrasonic Radiation

19980005264 National Inst. for Occupational Safety and Health, Pittsburgh, PA USA
Second-Generation Remote Optical Methanometer
Franks, R. A., National Inst. for Occupational Safety and Health, USA; Opferman, J. J., National Inst. for Occupational Safety and Health, USA; Friel, G. F., National Inst. for Occupational Safety and Health, USA; Edwards, J. C., National Inst. for Occupational Safety and Health, USA; May 1997; 15p; In English
Report No.(s): PB97-165039; NIOSH-RI-9640; DHHS/PUB/NIOSH-97-126; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A second-generation Remote Optical Methanometer (ROM) has been designed and is undergoing laboratory evaluation at the National Institute for Occupational Safety and Health. The new instrument differs from the previous prototypes by the replacement of the two-band pass differential absorption technique of measurement with single- filter gas correlation technique and a refinement of the amplifier and gating circuitry used within the unit. This results in a more accurate isolation of the CH4 spectral absorption band centered at 3.31 micrometers. A specially designed 0.4-m-diam variable-length gas mixing tunnel was constructed and instrumented with CH4-sampling capacity to calibrate the ROM.
NTIS
Remote Sensors; Gas Detectors; Mining; Design Analysis

19980005608 NERAC, Inc., Tolland, CT USA
Accelerometers. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)
Sep. 1996; In English; Page count unavailable.
Report No.(s): PB96-873633; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning accelerometers for measuring motion, vibration, shear, shock wave, and gravity. Citations describe the design and manufacture of semiconductor, micromechanical, monolithic, strain sensitive, servo, and gravitational accelerometers. Applications in automotive vehicles are presented. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Accelerometers

19980005613 NERAC, Inc., Tolland, CT USA
Applications of Holography. (Latest citations from the NTIS Bibliographic Database)
Sep. 1996; In English; Page count unavailable. Supersedes PB96-873591.
Report No.(s): PB96-873609; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the applications of holographic interferometry. References review holographic types, data storage and reduction, tomographic reconstruction, surface deformation analysis, flow visualization, vibration analysis, and dimension stability. Applications in aerospace, mechanical engineering, fluid mechanics, and nondestructive testing are covered. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Holographic Interferometry

19980005710 NERAC, Inc., Tolland, CT USA
Fiber Optic Temperature Measurement, Sensors, and Thermometers (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870498; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, and evaluation of fiber optic temperature sensors and thermometers. References to distributed temperature measurement, high temperature sensors, digital and spectral methods,

and interference techniques are presented. Applications in power plants, commercial plants, internal combustion engines, environmental studies, and air pollution control are examined.
NTIS
Bibliographies; Fiber Optics; Design Analysis; Product Development; Evaluation; Temperature Measurement; Temperature Sensors

19980005713 NERAC, Inc., Tolland, CT USA
Photoconductors in Electrophotography (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870696; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and evaluation of photoconductive materials for use in electrophotographic devices. Topics include organic photoreceptors, photoconducting polymers, charge and carrier transport materials and layers, electrophotographic receptors and layers, and digital electrophotography. Applications in data recording, x-ray imaging, and high speed printing are discussed.
NTIS
Bibliographies; Product Development; Evaluation; Photoconductors

36
LASERS AND MASERS

Includes parametric amplifiers. For related information see also 76 Solid-State Physics.

19980003906 NERAC, Inc., Tolland, CT USA
Surface Emitting Lasers . (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)
Nov. 1996; In English; Page count unavailable.
Report No.(s): PB97-852032; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the design and fabrication of surface emitting lasers. Citations describe vertical cavity, semiconductor, tunable, and heterostructure lasers. Topics include semiconductor layers and structures, distributed Bragg reflectors, light modulation, integrated power monitors, cavity resonators, optical pumping, and quantum wells. Applications cover light-emitting devices, optical memory systems, laser printing, oxygen sensors, ultrasound detectors, and electro-optical devices.
NTIS
Bibliographies; Semiconductor Lasers; Surface Emitting Lasers; Semiconductor Devices; Surface Properties; Light Modulation; Fabrication; Bragg Reflectors

19980004524 Lawrence Livermore National Lab., Livermore, CA USA
Microsecond-long lasing delays in thin P-clad InGaAs QW lasers
Wu, C. H., Florida Univ., USA; Miester, C. F, Florida Univ., USA; Zory, P. S., Florida Univ., USA; Emanuel, M. A., Lawrence Livermore National Lab., USA; Jun. 1996; 5p; In English; Photonic Sensors and Controls for Commercial Applications, 19-21 Nov. 1996, Boston, MA, USA; Sponsored by International Society for Optical Engineering, USA
Contract(s)/Grant(s): W-7405-eng-48
Report No.(s): UCRL-JC-124871; CONF-961113-25; DE96-013881; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Microsecond-long lasing delays have been observed in wide-stripe, thin p-clad, InGaAs single quantum well (QW) lasers with 'thick' p(sup +) cap layers. Computer modeling indicates that localized refractive index changes in the cap layer due to ohmic heating from the contact resistance may be the root cause.
DOE
Indium Gallium Arsenides; Computerized Simulation; Quantum Well Lasers; Lasers

19980004668 Tennessee Univ., Dept. of Physics and Astronomy, Knoxville, TN USA

Chaos: Understanding and Controlling Laser Instability ***Final Report, 15 May - 14 Nov. 1997***

Blass, William E., Tennessee Univ., USA; Dec. 1997; 19p; In English

Contract(s)/Grant(s): NCC5-88

Report No.(s): NASA/CR-97-206477; NAS 1.26:206477; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In order to characterize the behavior of tunable diode lasers (TDL), the first step in the project involved the redesign of the TDL system here at the University of Tennessee Molecular Systems Laboratory (UTMSL). Having made these changes it was next necessary to optimize the new optical system. This involved the fine adjustments to the optical components, particularly in the monochromator, to minimize the aberrations of coma and astigmatism and to assure that the energy from the beam is focused properly on the detector element. The next step involved the taking of preliminary data. We were then ready for the analysis of the preliminary data. This required the development of computer programs that use mathematical techniques to look for signatures of chaos. Commercial programs were also employed. We discovered some indication of high dimensional chaos, but were hampered by the low sample rate of 200 KSPS (kilosamples/sec) and even more by our sample size of 1024 (1K) data points. These limitations were expected and we added a high speed data acquisition board. We incorporated into the system a computer with a 40 MSPS (million samples/sec) data acquisition board. This board can also capture 64K of data points so that were then able to perform the more accurate tests for chaos. The results were dramatic and compelling, we had demonstrated that the lead salt diode laser had a chaotic frequency output. Having identified the chaotic character in our TDL data, we proceeded to stage two as outlined in our original proposal. This required the use of an Occasional Proportional Feedback (OPF) controller to facilitate the control and stabilization of the TDL system output. The controller was designed and fabricated at GSFC and debugged in our laboratories. After some trial and error efforts, we achieved chaos control of the frequency emissions of the laser. The two publications appended to this introduction detail the entire project and its results.

Derived from text

Diodes; Lasers; Semiconductor Lasers; Tunable Lasers; Data Acquisition; Optical Equipment

19980004670 Arizona Univ., Optical Sciences Center, Tucson, AZ USA

An Organic Thin Film Laser Diode: A New and Novel Light Source ***Final Report, 1 Dec. 1993 - 31 May 1997***

Peyghambarian, N., Arizona Univ., USA; Mazumdar, S., Arizona Univ., USA; Armstrong, N., Arizona Univ., USA; Kippelen, B., Arizona Univ., USA; Sep. 1997; 6p; In English

Report No.(s): AD-A330073; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This ONR program was focusing on the development of an entirely new diode laser, based upon electroluminescent organic thin films. During these three years, important milestones have been reached towards the demonstration of the first organic laser diode: (1) demonstration of electroluminescence from an organic channel waveguide device fabricated on glass and on Si; (2) optical gain in excess of 10(exp 4)/cm measured in a pure solid state conjugated polymer; (3) fabrication of feedback structures with 0.2 micron resolution. With the synthesis of new compounds and their characterization (determination of HOMO and LUMO levels), the performance of organic light emitting devices could be continuously improved. Current devices exhibit external quantum efficiencies as high as 3 % with a stable aluminum cathode. Output light levels in excess of 45,000 cd/sq m (500,000 cd/sq m in pulsed regime) are measured at this stage and are getting close to the levels required to achieve gain in electrically injected structures. Finally our research efforts have led to the recent demonstration of optically pumped integrated organic laser diodes using several configurations. Simultaneously, we have developed a complete theory of optical absorption in PPV and determined the origin of photo- induced absorption in this material and other pi-conjugated polymers.

DTIC

Light Sources; Lasers; Thin Films; Diodes

19980004776 Centre d'Etudes de Limeil-Valenton, Villeneuve Saint-Georges, France

Self-focusing and filamentation of a laser beam within the paraxial stationary approximation, Part 2, Computer simulations ***Autofocalisation et filamentation d'un faisceau laser dans le cadre de l'approximation paraxiale et stationnaire, Partie 2, Simulations numeriques***

Blain, M. A., Centre d'Etudes de Limeil-Valenton, France; Bonnaud, G., Centre d'Etudes de Limeil-Valenton, France; Chiron, A., Centre d'Etudes de Limeil-Valenton, France; Riazuelo, G., Centre d'Etudes de Limeil-Valenton, France; Feb. 1996; 86p; In French

Report No.(s): CEA-R-5716-Pt-2; DE97-621410; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

This report addresses the propagation of an intense laser beam in a unmagnetized plasma, which is relevant for both the Inertial Confinement Fusion (ICF) and the Ultra-High Intensity (UHI) pulses. The width and the irradiance of the laser pulses are

respectively: (0.1-10) nanosecond and (10(exp 13)-10(exp 16)) W/sq cm for the ICF context and (0.1-1) picosecond and in excess of 10(exp 18) W/sq cm for the UHI context. The nonlinear mechanisms for beam self-focusing and filamentation, induced by both the ponderomotive expelling of charged particles and the relativistic increase of the electron mass, are specified studied. Part 1 deals with the theoretical aspects and part 2 is concerned with the results of two-dimensional simulations. The results have been obtained within the framework of the paraxial approximation and the stationary response of the plasma. The large set of scenarios that characterize the behavior of Gaussian beam and a modulated beam is presented; a synthetic overview of the previous theoretical works is also provided. The interplay of two crossing beams is discussed. This report will be a help to improve the uniformity of the laser irradiation in the ICF context and to channel a very intense laser beam over large distance in the UHI context.
DOE
Laser Beams; Self Focusing; Computerized Simulation; Plasma Focus; Solar Prominences

19980005213 American Univ., Washington, DC USA
Development of State of the Art Solid State Lasers for Altimetry and other LIDAR Applications ***Annual Report No. 3***
Kay, Richard B., American Univ., USA; 1997; 11p; In English
Contract(s)/Grant(s): NCC5-78
Report No.(s): NASA/CR-97-206451; NAS 1.26:206451; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report describes work performed and research accomplished through the end of 1997. During this time period, we have designed and fabricated two lasers for flight LIDAR applications to medium altitudes (Laser Vegetation Imaging System designs LVIS 1 and LVIS 2), designed one earth orbiting LIDAR transmitter (VCL-Alt), and continued work on a high rep-rate LIDAR laser (Raster Scanned Altimeter, RASCAL). Additionally, a 'White Paper' was prepared which evaluates the current state of the art of Nd:YAG lasers and projects efficiencies to the year 2004. This report is attached as Appendix 1 of this report.
Author
Product Development; Solid State Lasers; Optical Radar

19980005266 NERAC, Inc., Tolland, CT USA
Laser Doppler Velocimetry. (Latest citations from the INSPEC Database)
Feb. 1997; In English; Page count unavailable
Report No.(s): PB97-856025; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
The bibliography contains citations concerning the technology and performance of laser Doppler velocimetry. References review the studies of supersonic, turbulent, pipe, slurry, two-phase, gas-liquid, and swirl flow. Applications include crystal growth from vapor, dense aerosol flow, chemical variable measurements, and heated liquid flow.
NTIS
Aerosols; Bibliographies; Crystal Growth; Liquid Flow; Liquid-Gas Mixtures; Pipes (Tubes)

19980005362 NERAC, Inc., Tolland, CT USA
Velocity Measurement: Laser Applications (Latest citations from the US Patent Bibliographic File with Exemplary Claims)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870076; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
The bibliography contains citations of selected patents concerning the use of lasers in the velocity measurement of fluids and solid objects. Specific devices and application methods, and noise reduction techniques in laser Doppler velocimeter systems are discussed. Applications are described, including the measurement of air speed, blood flow, the rotation and vibration of mechanical components, and particulate matter in fluids.
NTIS
Bibliographies; Velocity Measurement; Laser Applications; Noise Reduction; Blood Flow; Vibration; Airspeed

19980005393 NERAC, Inc., Tolland, CT USA
Laser Scanning: Technology and Applications (Latest citations from the Ei Compendex*Plus Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870050; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
The bibliography contains citations concerning laser scanning technology and its applications. Topics include a discussion of omnidirectional and volume laser scanners, Scanning Laser Acoustic Microscope (SLAM), and holofacet laser scanners. Laser

scanners are used for automatic inspection in integrated circuit manufacture, and industrial and nuclear power plant sensors; alignment for machining and lithographic writing; imaging techniques for laser printers, and scientific and medical applications; readers for barcoded objects; and guidance for autonomous vehicles. Also included are some applications involving the laser scanner as a direct manufacturing tool, as in crystal annealing and glass etching.
NTIS
Bibliographies; Optical Scanners; Technology Utilization

19980005629 National Inst. of Standards and Technology, Optoelectronics Div., Boulder, CO USA
Cavity Coupling in Vertical-Cavity Semiconductor Lasers
Schaafsma, D. T., National Inst. of Standards and Technology, USA; Christensen, D. H., National Inst. of Standards and Technology, USA; Jan. 1997; 149p; In English
Report No.(s): PB97-159446; NISTIR-5047; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This work explores two types of coupling in planar cavities: emitter coupling, a light-matter interaction; and mode coupling, a light-only interaction. Technological applications of coupling effects are discussed, along with novel metrology designed for devices such as VCSELs. A novel experimental technique for probing the side-emission from VCSELs is also described and is used both to probe for coupling effects and to serve as a metrological tool. Experiments designed to probe for emitter coupling in VCSELs are described and their results show that the effect of the cavity on the emitter can indeed be seen in side emission studies. The general effects of mode coupling are illustrated in a simplified experiment designed to show the strong redistribution of energy from a dipole inside an etalon, which is more pronounced than the normal etalon redistribution effects for light originating outside the cavity. This type of coupling to cavity modes is then examined in VCSEL structures and shown to be potent enough for device applications.
NTIS
Semiconductor Lasers; Coupled Modes; Laser Cavities; Metrology; Surface Emitting Lasers

19980005661 Centre d'Etudes de Limeil-Valenton, Villeneuve Saint-Georges, France
Self-focusing and filamentation of a laser beam within the paraxial stationary approximation, Part 1, Theoretical aspects
Autofocalisation et filamentation d'un faisceau laser dans le cadre de l'approximation paraxiale et stationnaire, Partie 1, Aspects theoriques
Blain, M. A., Centre d'Etudes de Limeil-Valenton, France; Bonnaud, G., Centre d'Etudes de Limeil-Valenton, France; Chiron, A., Centre d'Etudes de Limeil-Valenton, France; Riazuelo, G., Centre d'Etudes de Limeil-Valenton, France; Feb. 1996; 72p; In French
Report No.(s): CEA-R-5716-Pt-1; DE97-621409; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

This report addresses the propagation of an intense laser beam in a unmagnetized plasma, which is relevant for both the inertial confinement fusion (ICF) and the ultra-high intensity (UHI) pulses. The width and the irradiance of the laser pulses are respectively: (0.1-10) nanosecond and (10(exp 13)-10(exp 16)) W/sq cm for the ICF context and (0.1-1) picosecond and in excess of 10(exp 18) W/sq cm for the UHI context. The nonlinear mechanisms for beam self-focusing and filamentation, induced by both the ponderomotive expelling of charged particles and the relativistic increase of the electron mass, are specified studied. Part 1 deals with the theoretical aspects and part 2 is concerned with the results of two-dimensional simulations. The results have been obtained within the framework of the paraxial approximation and the stationary response of the plasma. The large set of scenarios that characterize the behavior of Gaussian beam and a modulated beam is presented; a synthetic overview of the previous theoretical works is also provided. The interplay of two crossing beams is discussed. This report will be a help to improve the uniformity of the laser irradiation in the ICF context and to channel a very intense laser beam over large distance in the UHI context.
DOE
Plasmas (Physics); Electromagnetic Radiation; Inertial Confinement Fusion; Laser Outputs; Pulsed Lasers; Charged Particles; Electron Mass; Irradiation

19980006230 NERAC, Inc., Tolland, CT USA
Atmospheric Effects on Laser Beams (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870225; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the atmospheric effects on laser beam propagation. Citations discuss atmospheric turbulence, transmittance, refraction, attenuation, scattering, and backscattering. References to adaptive optics, atmo-

spheric correction, and compensation techniques are included. Applications in laser tracking, rangefinding, optical radar, and laser communications are examined. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Atmospheric Effects; Laser Beams

37
MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

19980003922 NERAC, Inc., Tolland, CT USA
Lubrication for High and Extreme Pressures (Latest citations from the US Patent Bibliographic File with Exemplary Claims)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851299; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning compositions and applications of extreme pressure (EP) lubricants. The citations include compositions and methods of producing lubricant additives containing boron, sulfur, phosphorous, organic compounds, and metal complexes. Applications include lubricants for gears, metal working, wire drawing, vehicles, and machines.
NTIS
Bibliographies; Boron Compounds; Complex Compounds; Organic Compounds; Sulfur Compounds; Metal Working

19980004057 NERAC, Inc., Tolland, CT USA
Gear Design and Testing: Latest citations from the Aerospace Database
Aug. 1996; In English; Page Count Unavailable
Report No.(s): PB96-872742; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

The bibliography contains citations concerning the design and testing of gears and gearboxes. Computerized techniques are used in the design and evaluation phases. Subject matter includes gear cutting, gear wear and lubrication, reliability, and performance. Applications include gears and gearboxes in engines, helicopters, mechanical power transmission and drive systems, and geared pumps. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Computer Aided Design; Gears; Performance Tests

19980004142 NERAC, Inc., Tolland, CT USA
Robotic Welding of Aluminum Alloys: Latest citations from the Aluminum Industry Abstracts Database
Jun. 1996; In English; Page count unavailable.
Report No.(s): PB96-871116; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use of robots for welding aluminum alloys. Citations focus on the methods, equipment, and economics of robotic welding. Welding of castings, extrusions and plate is included.
NTIS
Bibliographies; Aluminum Alloys; Aluminum; Castings; Welding; Robotics; Robots

19980004733 Southwest Research Inst., Mechanical and Fluids Engineering Div., San Antonio, TX USA
Compressor Diagnostics Software: Development, Test, and Evaluation ***Final Report, Dec. 1986 - Dec. 1995***
Smalley, A. J., Southwest Research Inst., USA; Dec. 1995; 450p; In English; Sponsored in part by Pipeline and Compressor Research Council.
Report No.(s): PB96-146527; SWRI-04-5062-611; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This report describes development, test, and evaluation by industrial users of a software package to assist performance analysis and fault diagnosis for reciprocating compressors. The software compares measured variation of cylinder pressure against predictions of a model, and responds to discrepancies by adjusting model parameters (including fault magnitudes) until predictions

match the measurements. The result is a performance analysis including a quantitative diagnosis of inferred faults. The performance information includes a flow, power, effective clearance, temperature rise, and various derived quantities. The software can analyze a single cylinder end or a complete multi-cylinder compressor.
NTIS
Applications Programs (Computers); Reliability Analysis; Error Analysis; Reciprocation; Compressors; Diagnosis

19980004746 Los Alamos National Lab., NM USA
Research on microwave joining of SiC, Part 1
Silberglitt, R., FM Technologies, Inc., USA; Jul. 31, 1995; 13p; In English
Contract(s)/Grant(s): W-7405-eng-36
Report No.(s): LA-Sub-95-192-Pt-1; DE97-002600; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Results: identification of optimum joining temperature range for reaction bonded Si carbide at 1420-1500 C; demonstration that specimens joined within this range have fracture roughness greater than as-received material; and demonstration of ability to use SiC formed in situ from the decomposition of polycarbosilane as a joining aid for sintered Si carbide. In the latter case, the interlayer material was also shown to fill any pores in the joining specimens near the interlayer. Together with the demonstration of leaktight joints between tube sections of reaction bonded and sintered SiC under the previous contract, these results provide the foundation for scaleup to joining of the larger and longer tubes needed for radiant burner and heat exchanger tube assemblies. The formation of SiC in situ is important because maintaining roundness of these large tubes is a technical challenge for the tube manufacturer, so that formation of a leaktight joint may require some degree of gap filling.
DOE
Polycarbosilanes; Heat Exchangers; Decomposition; Surface Roughness; Porosity

19980005268 MIL Systems Engineering, Ottawa, Ontario Canada
Weld Detail Fatigue Life Improvement Techniques ***Final Report***
Kirkhope, K. J., MIL Systems Engineering, Canada; Bell, R., MIL Systems Engineering, Canada; Caron, L., MIL Systems Engineering, Canada; Basu, R. I., MIL Systems Engineering, Canada; Dec. 1996; 138p; In English
Report No.(s): PB97-193031; SR-1379; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Fatigue cracks in steel ships often occur at welded joints where stress concentration due to the joint geometry are relatively high and the fatigue strength of the weld is reduced in comparison to that of the base metal. This becomes more critical in ships build of High Strength Steels (HSS) because the fatigue strength of steel in the as-welded condition does not increase in proportion to the yield or tensile strength. In many cases, the fatigue performance severely loaded details can be improved by employing good detail design practices, for example by upgrading the welded detail class to one having a higher fatigue strength. to date, weld fatigue life improvment techniques have been successfully applied in several industries. While there has been increasing interest in the application of fatigue life improvement techniques to ship structures, at present there is a lack of guidance on the use of such techniques for design, construction and repair. Hence the key elements of this project were to compile available data on fatigue life improvement techniques, assess the feasibility and practicality for their application to ship details, identify gaps in the technology, and finally to recommend design, construction and repair requirements.
NTIS
Fatigue Life; Welded Joints; Ships; High Strength Steels; Technologies; Feasibility

19980005346 Technische Univ., Faculty of Chemical Technology and Materials Science, Delft, Netherlands
Catalytic Diesel Exhaust Purification: A DRIFT Spectroscopic and Mechanistic Study of Soot Oxidation
Mul, G., Technische Univ., Netherlands; 1997; 230p; In English
Report No.(s): PB97-196521; Copyright Waived; Avail: CASI; A11, Hardcopy; A03, Microfiche

This thesis deal with catalytic oxidation of soot particulates. As the oxidation of soot occurs around 875 K, and the temperature of diesel exhaust (dependent on the loading of the diesel-engine) hardly ever exceeds 625 K, catalytic oxidation of soot is required. Three major groups of catalytically active materials are known: catalysts based on transition metal chlorides, catalysts based on alkali metal oxides and - carbonates, and catalysts based on transition metal oxides. Fourier Transformed InfraRed (FT-IR) spectroscopy is an excellent analytical technique to study the surface composition of carbonaceous materials. Moreover, FT-IR spectroscopy allows a characterization of metal oxides and other catalysts. Therefore, this is the main technique used throughout this

thesis, with the objective to reveal the mechanism of catalytic soot oxidation. The activity of the mentioned groups of catalysts are evaluated, as well as the effect of other components of diesel exhaust, i.e. NO and CO, on the catalytic performance.
NTIS
Soot; Oxidation; Catalysis; Catalysts

19980005605 NERAC, Inc., Tolland, CT USA
Microelectromechanical Systems: Technology and Applications. (Latest citations from the INSPEC database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-865613; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, application, and manufacture of microelectromechanical systems. Citations focus on CAD tools, microminiaturization technologies, fabrication, optical interconnects, micromachining, and ferroelectric and piezoelectric thin films. Projects at Lawrence Livermore National Laboratory, related technologies, and foreign developments are covered. Applications include sensors, force transducers, microrelays, microactuators, micromotors, and micromirror devices.
NTIS
Bibliographies; Ferromagnetic Materials; Design Analysis; Manufacturing; Microminiaturization; Micromachining; Technology Utilization

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QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

19980003927 NERAC, Inc., Tolland, CT USA
Reliability Testing. (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-857503.
Report No.(s): PB97-851869; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning reliability testing of electric and electronic devices and assemblies. Environmental Stress Screening (ESS) and accelerated life procedures are described. Methods for accelerating the infant mortality rate of components by inducing thermal and vibration stresses are also described. Methods for predicting Mean Time Between Failures (MTBF) and failure rates based on test parameters and data are included.
NTIS
Bibliographies; Reliability; Life (Durability); Vibration Tests

19980003953 New Jersey Inst. of Tech., Inst. for Transportation, Newark, NJ USA
Pipeline Industry: Electronic Incident/Accident/Annual Report and Audit System ***Final Report***
Greenfeld, J., New Jersey Inst. of Tech., USA; Golub, E., New Jersey Inst. of Tech., USA; Dresnack, R., New Jersey Inst. of Tech., USA; Griffis, F. H., New Jersey Inst. of Tech., USA; Pignataro, L. J., New Jersey Inst. of Tech., USA; Feb. 28, 1997; 60p; In English; See also PB97-199137 and PB97-199194.
Contract(s)/Grant(s): DTRS-56-94-C-0006
Report No.(s): PB97-199103; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The purpose of this study is to review issues regarding data quality which are deficient in the current pipeline incident/accident/annual reporting system and suggest an innovative solution for improving the situation. Data quality issues that have been reviewed are data entry errors, data reporting errors, numerical and logical inconsistencies among data fields and lack of standard definitions for describing failure circumstances. The solution developed herein is an electronic filling and data auditing system which will help the operators in the report filling process and alert OPS to data errors, inconsistencies and deficiencies in the submitted report. It will also eliminate the need for manual data input which is another source for errors in the databases.
NTIS
Pipelines; Industries; Accidents

19980004126 Dayton Univ. Research Inst., Integrated Methods Material Characterization Group, OH USA

An Advanced Test System for the Characterization of Aerospace Materials in Severe Service Environments ***Final Report, 1 Aug. 1995 - 31 Jan. 1997***

Schehl, Norman D., Dayton Univ. Research Inst., USA; Aug. 1997; 24p; In English

Contract(s)/Grant(s): F49620-95-I-0498

Report No.(s): AD-A329824; AFOSR-TR-97-0344; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A unique, advanced test system for the characterization of materials was designed and assembled. The test system is capable of simulating the mechanical, thermal, vacuum and variable atmospheric environments that high performance aerospace materials are subjected to during service. Details of the design, optimization, and performance testing of this system are described.

DTIC

Aircraft Engines; Performance Tests; Design Analysis; Nondestructive Tests

19980004686 INVOCON, Conroe, TX USA

Site Inspection of Gas Mains by Helical Tomography (SIGHT) Phase 1 ***Final Report, Jun. 1991 - Jan. 1994***

Keifer, K., INVOCON, USA; Jan. 1994; 180p; In English

Report No.(s): PB97-121578; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Approximately 700,000 miles of buried gas pipes of varying sizes and materials exist day-to-day service. In most cases, the exact state of degradation of the mains is generally not known. This lack of information can result in leaks as well as wasted time locating the defect so that repairs can be made. Hence, a method of assessing the condition of gas mains and recording the data for future references and analysis is needed. With this capability, utilities can monitor the condition of mains and develop repair and/or replacement strategies. Phase 1 of the SIGHT contract produced good results on experiments that were designed to demonstrate the ability of a prototype ultrasonic sensor to 'couple' ultrasonic energy from the transducer face to the pipe wall under test. This coupling was demonstrated while the sensor was moving over the surface of the material under test. Further, it was shown that the coupling to steel and plastic pipe could take place without the use of liquid or grease between the transducer and the material-under-test.

NTIS

Inspection; Gas Pipes; Natural Gas

19980004709 NERAC, Inc., Tolland, CT USA

Statistical Quality Control. Manufacturing: Latest citations from the Ei Compendex*Plus Database

May 1997; In English; Page count unavailable, Supersedes PB96-861679.

Report No.(s): PB97-860092; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning statistical quality control, a technique used to monitor and control a manufacturing process. Control is effected by an operator, who manages continuous feedback variables to achieve quality consistency in the end products. Waste is reduced greatly through this method, in contrast with systems that apply acceptance criteria to the end product only.

NTIS

Bibliographies; Manufacturing; Quality Control; Feedback

19980005122 Defence Science and Technology Organisation, Airframes and Engines Div., Melbourne, Australia

Methods of Early Fatigue Detection

Rajic, N., Defence Science and Technology Organisation, Australia; Tsoi, K., Defence Science and Technology Organisation, Australia; Oct. 1996; 31p; In English

Report No.(s): AD-A329898; DSTO-TN-0059; DODA-AR-009-903; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This note presents a brief review of techniques which may be applied to the detection of the early manifestations of fatigue damage in metals and also introduces two new methods which at the time of the preparation of this note were the subject of feasibility investigations at AMRL. In the first of these new methods, the fatigue state of a structure is inferred from variations in the electrical resistance of a metal foil bonded to the structure and subjected to the same loading history. The second method involves the infusion of radioactive hydrogen (tritium) into a structure that may contain fatigue damage. Damaged parts of the structure

act as preferred trapping sites for the tritium, and these may be detected by the emission of beta radiation from the decay of the trapped tritium.
DTIC
Electrical Resistance; Fatigue (Materials); Feasibility Analysis; Metal Foils; Radioactivity; Trapping; Tritium

19980006242 International Trade Centre UNCTAD/GATT, Geneva, Switzerland
World Directory of Information Sources on Standards, Technical Regulations, Certification, Eco-Labelling and Quality Management Schemes ***Repertoire Mondial des Sources d'Information sur les Normes, Reglements Techniques et Programmes de Certification, d'Eco-Etiquetage et de Gestion de la Qualite***
Mar. 1996; 58p; In English; In French; In Spanish
Report No.(s): PB96-186531; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
Contents include the following: National organizations; Regional organizations; and International organizations.
NTIS
Directories; Standards; Metrology; Quality Control

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STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress. For applications see 05 Aircraft Design, Testing and Performance and 18 Spacecraft Design, Testing and Performance.

19980003976 Technische Univ., Faculty of Aerospace Engineering, Delft, Netherlands
Buckling of Anisotropic General Shells of Revolution
Kilic, O., Technische Univ., Netherlands; Feb. 1997; 183p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-183123; MEMO-773; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche
The bifurcation behavior of anisotropic stiffened general shells of revolution is studied in this thesis using Sanders nonlinear shell questions. The boundary conditions are satisfied rigorously. The analysis starts with the derivation of the Sanders strain-displacement relations and the equilibrium equations. The nonlinear equilibrium equations are combined with partially inverted constitutive equations and the Kirchoff-Love condition to obtain a set of eight nonlinear differential equations that are first order in meridional direction. From these equations the equations governing the prebuckling, buckling and postbuckling states are derived using perturbation expansions for the unknowns. The prebuckling equations are reduced to ordinary differential equations with constant coefficients by assuming an axisymmetric solution for the prebuckling state. The buckling equations are reduced to ordinary differential equations with variable coefficients by using a Fourier decomposition in circumferential direction. The two point boundary value problems of the prebuckling and the buckling states are solved using a modified Potters' method that treats the boundary conditions separately to prevent singularities. Finally, numerical results, calculated with the newly developed computer code CALYME(ho) (Computational Bifurcation Analysis of Arbitrary Meridional Shells of Rho-Evolution), are presented for the prebuckling and buckling solutions.
NTIS
Anisotropic Shells; Structural Analysis; Boundary Conditions; Boundary Value Problems; Nonlinear Equations; Equilibrium Equations; Differential Equations; Buckling; Branching (Mathematics)

19980004080 Naval Surface Warfare Center, Survivability, Structures and Materials Directorate, Bethesda, MD USA
An Experimental Investigation of the Ultimate Strength of Stiffened Panels, Volume 2, Test Data ***Final Report***
White, Gregory J., Naval Surface Warfare Center, USA; Vroman, Robert H., Naval Surface Warfare Center, USA; Kihl, David P., Naval Surface Warfare Center, USA; Mourning, Sara E., Naval Surface Warfare Center, USA; Apr. 1997; 175p; In English
Report No.(s): AD-A330207; NSWCCD-TR-65-97/18-Vol-2; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche
A series of multi-bay steel grillages were tested to collapse in the Grillage Test Fixture at the U.S. Naval Academy. The grillages were nominally 1/3-scale models of typical warship deck structures. The tests were part of a student research project investigating reliability-based design methods for stiffened panels. The six nominally identical grillage specimens were made from ordinary steel and consisted of three panels (bays) stiffened longitudinally and transversely with T-shaped stiffeners. Three specimens were tested under in-plane loads only, and three were tested with a combination of in-plane loads and initial lateral pressure. During testing data were collected from strain gages and displacement transducers to quantify the structural behavior of the specimens under load. Theoretical predictions of failure mode and stress level are compared to observed values. The test results are also compared to results from similar tests conducted at other facilities. A finite element method analysis of the grillages subjected

to compressive axial load was conducted using ABAQUS and the results compared to the test results. The data from past tests and these tests are used to evaluate the accuracy of theoretical predictions over a wide range of test conditions.
DTIC
Rigid Structures; Load Tests; Collapse

19980004140 NERAC, Inc., Tolland, CT USA
Structural Mechanics Software: Latest citations from the NTIS Bibliographic Database
Jun. 1996; In English; Page count available, Supersedes PB95-865499.
Report No.(s): PB96-871082; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the architecture and assessment of software systems for use in the study of structural mechanics. Topics include structural dynamics, finite element analysis, concurrent and parallel computation, design spaces and rules, and flexible and portable software systems. References cover automatic structural design and analytical certification of aircraft structures.
NTIS
Bibliographies; Aircraft Structures; Dynamic Structural Analysis; Finite Element Method; Structural Analysis; Structural Design; Computer Programs

19980004775 Saclay Research Centre, Dept. de Technologie des Materiaux, Gif-sur-Yvette, France
Crack detection by mobile photothermal probe
Besnard, R., Saclay Research Centre, France; LeBlanc, A., Saclay Research Centre, France; Bodnar, J. L., Reims Univ., France; Egee, M., Reims Univ., France; Menu, C., Reims Univ., France; Sellier, J.Y., Intercontrole, France; 1993; 4p; In English; 12th; International Conference on Non-Destructive Evaluation In the Nuclear and Pressure Vessel Industries, 10-13 Oct. 1993, Philadelphia, PA, USA
Report No.(s): CEA-CONF-12336; CONF-931061; DE97-622396; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

This paper deals with an industrial method for crack detection. The apparatus presented is based on a mobile photothermal probe. It can be used under different modes (sinusoidal, pulsed or scanned excitation). Moreover, the description of the device provided includes theoretical and experimental results. (TEC).
DOE
Cracks; Detection; Infrared Radiation; Thermography

19980004830 Army Armament Research, Development and Engineering Center, Benet Labs., Watervliet, NY USA
Influence of the Bauschinger Effect on Residual Stress and Fatigue Lifetimes in Autofrettaged Thick-Walled Cylinders *Final Report*
Parker, Anthony P., Army Armament Research, Development and Engineering Center, USA; Underwood, John H., Army Armament Research, Development and Engineering Center, USA; Sep. 1997; 32p; In English
Report No.(s): AD-A330071; ARCCB-TR-97020; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This work addresses the influence of Bauschinger effect upon residual stresses and associated fatigue lifetimes for pressurized, autofrettaged thick cylinders. The model employed allows for the variation with radius of Bauschinger Effect Factor (BEF) throughout the autofrettaged tube since the percentage plastic strain, which determines BEF, will vary from a maximum value at the bore to zero at the elastic plastic interface. Accounting for BEF variability, it is demonstrated that the residual compressive hoop stress at the inner radius of the tube reaches a maximum value at the percentage overstrain level below which reversed yielding does not occur. Existing experimental residual stress measurements from a variety of sources are shown to support this thesis. This value of overstrain may serve to maximize crack initiation lifetime in autofrettaged thick cylinders. For a tube with significant heat checking and associated initial crack like defects, it is necessary to consider fatigue crack growth rates governed by a crack growth law such as Paris's Law. For a tube of radius ratio 2.0 and at a value of approximately 40 percent overstrain, slightly in excess of that for the onset of reversed yielding, the fatigue lifetime exhibits a maximum value. Fatigue lifetimes achieve a maximum value at overstrain levels in which yielding reaches 1.4 times bore radius and are almost constant thereafter. Furthermore, such extended overstrain leads to a small increase in residual stress at the Outside Diameter (OD), thus increasing R ratio at that location and reducing fatigue lifetime for crack growth originating at the OD. Existing experimental lifetime measurements are shown to require the inclusion of BEF to properly account for these observed lifetimes.
DTIC
Fatigue Life; Residual Stress; Bauschinger Effect

19980005241 Sydney Univ., Dept. of Civil Engineering, Australia

Local Buckling of Thin-Walled Circular Steel Sections with or without Internal Restraint ***Topical Report***

OShea, M. D., Sydney Univ., Australia; Bridge, R. Q., Sydney Univ., Australia; Apr. 1997; 129p; In English

Report No.(s): PB97-163018; RR-R740; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

In this report comprehensive series of tests are described and presented. The tests were performed to examine the behavior of short thin-walled circular steel tubes with or without internal restraint. The tubes had diameter to thickness ratios of between 55 and 200 and a length to diameter ratio of 3.5. The tests included bare steel tubes loaded both with axially and at small eccentricities, and axially loaded steel tubes with an internal restraint medium. The material properties have been measured including residual stresses and geometric imperfections. The test strengths have been compared to strength models in design standards and specifications. The design standards were found to be conservative for eccentrically loaded circular steel tubes especially those using a linear interaction between the axial load and moment.

NTIS

Design Analysis; Diameters; Eccentricity; Length; Residual Stress; Specifications; Standards

19980005330 Defence Science and Technology Organisation, Airframes and Engines Div., Canberra, Australia

Stress Analysis of an Interference Fit Life Extension Option for a Cold Expanded Elongated Fuel Flow Vent Hole on the F-111C Aircraft

Allan, R. B., Defence Science and Technology Organisation, Australia; Heller, M., Defence Science and Technology Organisation, Australia; Jun. 1997; 46p; In English

Report No.(s): AD-A329911; DSTO-TR-0549; DODA-AR-010-256; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This investigation has been undertaken as part of a program of work having the aim of determining a suitable fatigue life enhancement option for the non-circular fuel flow vent hole number 13 in the wing pivot fitting of the F-111C aircraft. Two types of stress analysis have been undertaken for a finite width rectangular plate of D6ac steel containing an elongated hole. Firstly, plate stress distributions due to interference fitting obtained from elastic two dimensional finite element analyses were compared to those measured experimentally using strain gauges and thermoelasticity. Secondly, two-dimensional elasti-plastic finite element analyses were undertaken to quantify the effect on critical plate stresses due to enhancement by combined cold expansion with interference fitting, in the presence of subsequent representative cold proof test loading and a sample spectrum loading. The predicted stresses for the elastic analysis cases agreed well with the experimental results, which also demonstrated the suitability of a proposed tapered plug/sleeve design to achieve effective interference fitting of an elongated hole. Overall, enhancement through combined cold expansion and interference fitting was considered to be significantly better than interference fitting alone. For example, the combined enhancement case, as compared to interference fitting only, led to a change in the critical hoop stress from 603 MPa, to -87 MPa. These favourable results indicate that such an enhancement procedure would potentially be suitable for extending the fatigue life of the fuel flow vent hole number 13 region of the F-111C aircraft, pending the results of appropriate static and fatigue tests.

DTIC

Stress Analysis; Fatigue Life; Engine Parts; Fuel Systems

19980005627 Sydney Univ., Dept. of Civil Engineering, Australia

Updated Lagrangian Formulation for Second-Order Elastic Analysis of Space Frames Using Beam Elements ***Topical Report***

The, L. H., Sydney Univ., Australia; Clarke, M. J., Sydney Univ., Australia; Sep. 1996; 48p; In English; Figures in this document may not be legible in microfiche; See also PB96-203740.

Report No.(s): PB97-136063; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

It has been demonstrated previously by the authors that conservative internal moments of a spatial beam are of the so-called fourth kind, and that the rotation variables which are work-conjugate with such moments are vectorial rotations. If the vectorial rotations of a spatial beam element are approximated by the corresponding transverse displacement derivatives to the first order in formulating the governing equilibrium equation, incorrect element stiffness matrices will result unless a measure is taken to account for the distinction between the two displacement parameters. The required correction naturally depends on the 'assumed' rotational behavior of internal moments in the system. The present work derives the stiffness matrices of a spatial beam element based on the definition knowledge of the rotational behavior of conservative internal moments established previously by the authors. It is shown through numerical experiments that the resulting computational algorithms are robust and accurate.

NTIS

Frames; Equilibrium Equations; Formulations; Lagrangian Function; Finite Element Method

19980005637 Centre for Engineering Research, Inc., Edmonton, Alberta Canada

Strength and Stability Testing of Stiffened Plate Components ***Final Report***

Chen, Q., Centre for Engineering Research, Inc., Canada; Zimmerman, T. J. E., Centre for Engineering Research, Inc., Canada; Degeer, D. D., Centre for Engineering Research, Inc., Canada; Kennedy, B. W., Centre for Engineering Research, Inc., Canada; 1997; 130p; In English

Report No.(s): PB97-156178; SSC-399; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

A full-scale testing system was designed and constructed to test stiffened steel plate specimens under combined axial and lateral loads. The system includes an assembly of plate edge restraints that was developed to represent the appropriate boundary conditions for a stiffened plate grillage system. A total of twelve specimens, including 'as-built' specimens, 'deformed' specimens and 'damaged' specimens, were tested in this set-up. Test variables included magnitude and direction of lateral loads, plate edge restraints, and local damage. The specimens failed by plate buckling, stiffener tripping or local collapse, as governed by the particular specimen and loading details. Load and displacement responses were determined for all specimens. to simulate the physical tests by numerical methods, a finite element model was constructed using ABAQUS. Five representative tests were analyzed to verify the numerical model. Comparison with the test results showed that the finite element analyses predict the failure mode and the ultimate strength with satisfactory accuracy.

NTIS

Metal Plates; Performance Tests; Stability Tests; Steels; Axial Loads; Failure Modes; Mathematical Models

19980006296 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Centre for Mechanical Engineering, Delft, Netherlands

Shock Transmission: Response Calculation of a Compartment of a Frigate with Discrete Masses and Rayleigh Damping ***Interim Report***

Trouwborst, W., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Jul. 03, 1997; 92p; In English; Original contains color illustrations

Contract(s)/Grant(s): A95/KM/117

Report No.(s): TNO-97-CMC-R0290; TD97-0267; Copyright; Avail: Issuing Activity (TNO Centre for Mechanical Engineering, Leeghwaterstraat 5, 2628 CA Delft, The Netherlands), Hardcopy, Microfiche

This report gives results as obtained with a finite element analysis using the finite element program DIANA of a compartment of a frigate loaded with a shock pulse based on the kick-off velocity concept. Three decks are included in the FEM model. The effects of discrete masses, either fixed at the deck or mounted at discrete springs (with and without damping), Rayleigh damping and excitation of the hull have been analysed. Responses at the decks are compared with the standard pulse shapes as defined in the Shock Handbook, which are generally used to define the shock loading of the equipment. Both the kick-off pulse and the standard pulses are based on the same underwater explosion.

Author

Finite Element Method; Shock Wave Propagation; Hulls (Structures); Compartments; Shock Tests